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THE ROYAL CANADIAN INSTITUTE



PROCEEDINGS

ROYAL GEOGRAPHICAL SOCIETY.



VOL. XL - 77

SESSION 1896-7. - 1897

LONDON, ENGL.

EDITED BY THE ASSISTANT SECRETARY

PROCEEDINGS

OF THE

ROYAL GEOGRAPHICAL SOCIETY.



VOL. XI. - 12

SESSION 1866-7. - 1868

Nos. I. to VI.

EDITED BY THE ASSISTANT SECRETARY.

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LONDON:

15, WHITEHALL PLACE.

1867. - 1868

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PROCEEDINGS

OF

THE ROYAL GEOGRAPHICAL SOCIETY.

[ISSUED FEBRUARY 11TH, 1867.]

SESSION 1866-7.

First Meeting, 12th November, 1866.

SIR RODERICK I. MURCHISON, BART., K.C.B., PRESIDENT, in
the Chair.

PRESENTATION.—*R. B. Byass, Esq.*

ELECTIONS.—*Anthony Maw Bower, Esq.; William Charles Luard, Esq.; Major J. J. Macdonell (71st Regt.); Herbert Henry Morris, Esq., B.A.*

ACCESSIONS TO THE LIBRARY SINCE THE LAST MEETING, JULY 9TH, 1866.—*Donations: 'Diary of a Journey Across Arabia, from El Khatif in the Persian Gulf to Gambo in the Red Sea,' by P. Byan, Esq. 'Die Völker des österlichen Asiens,' by Dr. A. Bastian. 'Mémoire sur l'Ethnographie de la Perse,' by M. N. de Khanikof. 'Abstract of the Adventures of Ladislaus Magyar in South Africa,' by Dr. Rónay. 'Report on the Headwaters of the River Waitaki,' by Dr. J. Haast. 'A Manual of Surveying for India,' by Capt. Smythe and Col. Thuillier. 'Report on the Chinchona Cultivation in India,' by C. R. Markham, Esq., F.R.A.S., &c. 'On the Budgets and Accounts of England and France,' by Major-Gen. G. Balfour, C.B., R.A., &c. 'Reisen durch Süd-Amerika,' vol. i., by J. J. von Tschudi. 'Les Portes-canaux. Sul moto ondosso del Mare,' by A. Cialdi. 'Charbon de Terre en Russie,' by von Helmersen. 'Reliquiæ Aquitaniæ,' by E. L. and S. Christy. All presented by the Authors. 'Reports on the Trade at the Ports in China, open by Treaty to Foreign Trade, for 1865 and 1866,' presented by J. H. Fitzroy, Esq. 'Relation de plusieurs Voyages à la Côte de l'Afrique,' presented by S. M. Drach, Esq. 'Calanderio y guia de*

forasteros de la Republica Peruana,' 3 vols.; presented by W. Bollaert, Esq.

Purchased.—'Grönland geographisk og statistik beskrevet,' by M. H. Rink. 'De danske Handelsgestricter in Nord-Grönland,' 2 vols., by M. H. Rink. 'Annales de la Propagation de la Foi,' 23 vols. 'A Voyage Round the world in H.M.S. *Pandora*,' by Capt. Edwards. 'China Opened,' 2 vols., by Rev. C. Gutzlaff. 'Lettera rarissima di C. Colombo,' by A. B. Morelli. 'Voyages en diverses parties de l'Europe, de l'Afrique, et de l'Amerique,' 2 vols. 'Primera parte de los comentarios reales, que tratan de el origen de los Incas,' &c., 4 vols., by Garcilasso de la Vega. 'Historia Antipodum; oder Neue Welt,' von Johann L. Gottfried. 'A Description of the Persian Monarchy, now being the Oriental Indies,' by Thos. Herbert. Swinburn's 'Travels in the Two Sicilies.' 'Correspondence respecting the British Captives in Abyssinia' (Blue Book). Baker's 'Albert Nyanza' (2nd copy). 'De Aanmerkenswaardigste en Alomberoemde Zee- en Landreizen der Portugeezen, &c., in Oost- en Westindien,' 8 vols. 'Travels in Russia, the Krimea, the Caucasus, and Georgia,' 2 vols., by Robert Lyell, M.D., &c. 'Recueil de divers Voyages fait en Afrique et en Amerique.' 'Travels and Voyages through Europe, Asia, and Africa,' by Wm. Lithgow. 'Recherches sur les Voyages et Decouvertes des Navigateurs Normands en Afrique,' &c., par L. Estancelin. 'Dissertazione intorno ad alcuni viaggiatori eruditi Veneziani,' &c., da Don J. Morelli. All added to the Library by purchase. Continuations of Journals, Transactions, &c.

ACCESSIONS TO THE MAP-ROOM SINCE THE LAST ANNIVERSARY, MAY 28TH, 1866.—A Map of the Kirghiz Steppe and Regions of the Orenburg, and Siberian Kirghizes, from a Russian Map. A Map of the Pearl-banks of Tuticorin and Trichendoor, by C. R. Markham, Esq. A Map of Bohemia, showing the Scene of the late Battles; copied by the photo-zincographic process from the Austrian Map. A Map of British Burmah, showing routes from Maulmain to the Shan States, by W. Montgomerie, Esq. A Map of the Survey of the Province of Pegu, by Lieut. E. C. Williams. A Map of the Province of Martaban from Martaban to Tounngoo, by A. Hobday. An Outline Map, showing the Boundary of the British and Siamese Territories of the Malay Peninsula. A Map of Moravia; on 4 sheets; copied by the photo-zincographic process from the Austrian Government Map, at the Ordnance Survey Office. Two Maps of the Vicinities of Vienna, Presburg, and Feldsburg; copied from the Austrian Government Map, at the Ordnance Survey Office. A Geo-

logical Map of the Department of the Seine; on 4 sheets; by M. Delesse. A Map of the Chain of Monte Rosa; photographed from the Carte Federale of Switzerland, by A. A. Reilly. A Map of the Lower Course of the Jordan and of the Dead Sea, by Lieut. Vignes. A Map of the Wady Arabah and of the Bed of the Wady el Jeib, by Lieut. Vignes. A Geological Map of Saxony and Magdeburg; on 4 sheets; by J. Ewald. 4 Sheets of a Geological Map of Rhenish Prussia. A Map of the Gold Region of the Frazer River, &c., by J. Wyld. A Map of the Province of Valdivia, by Bernardo E. Philippi. A Map of part of the Province of Tarapaca, from Port Conajagua to Ojaica. A Plan of the City and Port of Valparaiso. A Plan of the City of Lima. General Atlas of the World; on 30 sheets; by Dr. Henry Lange. Chromo-lithographic Atlas of Saxony; on 12 sheets; by Dr. Henry Lange. A School-Atlas of Saxony; on 3 sheets; by Dr. Henry Lange. The Bust of the President, Sir R. I. Murchison, Bart., K.C.B., by Amelia R. Hill. A Map of the Mekran Coast from Kurrachee to Guadur, showing the Route of Lieut. Ross. A Map of the Route of Lieut.-Col. Goldsmid and Major Smith from Ispahan to Choubar and Bunder Abbas. A Map of the Neilgherri and Koondah Hills, &c. A new Map of Railways and other Improvements of London. Stanford's Library Map of Africa, by A. K. Johnston. A Plan of the Kaimenies or Burnt Islands in the Crater of Santorin Island, showing the effects of the late Volcanic eruptions, by Capt. Lindesay Brine, R.N. A Chart showing the Temperature of the Currents off the Cape of Good Hope, by H. Toynbee, Esq. A Photograph of H.M.S. *Bombay*, destroyed by fire off Monte Video. A Chart of the Nicobar Islands, by Commodore B. v. Wüllerstorff-Urbair. A Map of the Punjab; on 8 sheets; by Lieut.-Col. D. R. Robinson, R.E. Chinese Map of the Inner City of Pekin; presented by H. Kopsch and E. Taintor, Esq. Black's New Map of England and Wales, by J. Bartholomew; on 16 sheets. Ordnance Survey, 883 sheets. Admiralty Charts, 37 sheets.

The PRESIDENT opened the Session with the following Address:—

GENTLEMEN,—Although I feel assured that the Session now opened will be productive of highly interesting results, particularly in respect to explorations in Asia and South America, I cannot lead you to hope for any such important discovery in Africa as that with which Sir Samuel Baker delighted us in the past year; nor can we be excited as we were upon Du Chaillu's return after his last effort to penetrate into Equatorial Africa. Until the grand problem of what is the true watershed of the vast unexplored region far to the south

of the huge water-basins which feed the Nile, the Victoria Nyanza of Speke and Grant, and the Albert Nyanza of Baker, which we earnestly and hopefully look for at the hands of Livingstone, we cannot expect to be gratified as we were when the narratives of those distinguished explorers were brought before us. In the mean time, however, I rejoice to be able to inform you that, by the last accounts received, the indefatigable and undaunted Livingstone was steadily advancing beyond the Rovuma River towards the interior, that he was in good health and spirits, and fully hopeful of success in defining the northern boundary of his own Lake Nyassa, and ascertaining whether it receives a water-supply from the north. Let us trust that, if he reaches the Lake Tanganyika of Burton and Speke, he may be enabled to determine whether it really lies in the great depression assigned to it by those travellers; and, if not, whether it has any issue to the North, so as to be, as it were, the ultimate southern feeder of the Nile (a theory of some geographers), or is there closed in by lofty mountains.

Turning to the consideration of a topic which deeply interests us, the fate of the few survivors of the wreck of the *St. Abbs*, East Indian, on the Somauli coast, north of Zanzibar, I would not make any statement which might too much encourage the hopes of those who have mourned the loss of relatives and friends; but I am happy to inform you that Lord Stanley, the Secretary of State for Foreign Affairs, has transmitted to me a copy of a despatch from Captain Pasley, R.N., commanding the *Highflyer*, by which it appears that a report still prevails of a white man, or of white men, having been seen at some days' march distant from the coast; and that an emissary has been sent inland with a promise of a reward of 100*l.* for every white person who may be rescued.

I cannot as yet enumerate the titles of many of the memoirs and narratives which will be brought before you in the course of the Session; but among those which have already been received, I strongly commend to your attention the paper which is to be read this evening, and which gives an account of the journey performed by Mr. W. H. Johnson, from Leh, in Little Tibet, to Khotan in Chinese Tartary, thus carrying his explorations far beyond the North-Western boundary of Western India. This important Paper has already elicited the unqualified approbation of Sir Henry Rawlinson, Lord Strangford, and Sir Andrew Scott Waugh. In alluding to this communication, I beg to direct your attention to the large new wall-map of Asia, which has been made during the recess, and a portion of which is now before you. This large map will doubtless render the reading of every paper on any part of Asia much more

intelligible to those who attend our meetings. We are all much indebted to Admiral Sir G. Back, Admiral Collinson, and General Balfour, under whose direction this grand diagram has been prepared.

In reference to South America, you will be glad to learn, that Mr. W. Chandless, the explorer of the Purûs River, to whom the Victoria Gold Medal was given at our last anniversary, has returned safely to England, after completing his self-imposed task by a second journey up the river, and a survey of its most important southern affluent, the Aquiry. The memoir which this distinguished traveller has prepared on the subject of this last journey will probably be read by himself before you in the course of the session.

Another important paper, on the Province of Caravaya, in Southern Peru, has been presented to the Society by our Honorary Corresponding Member, Don Antonio Raimondy, who has spent three years in exploring the region. The paper contains much new information about the river-systems of the district through which flows the Madre de Dios; and we may hope now to have a final solution of the difficulty which geographers have felt in connecting these streams with the rivers which flow into the Amazons.

Notwithstanding the want of success which our Council met with last year in their earnest endeavour to induce the Board of Admiralty to send out a scientific expedition to the North Pole, you will be glad to hear that we are now emboldened to make another effort, inasmuch as that powerful national body, the British Association for the Advancement of Science, has appointed a committee, of which I am the chairman, to urge upon Her Majesty's present Government the desirableness of carrying out a measure fraught with such interest to all geographers and naturalists. In such capacity, then, as well as in that of your President, it will be my duty to persevere in the endeavour to realise a North Pole survey, for the accomplishment of which the men of Science of other countries look to England and her experienced and undaunted Arctic seamen, who are most eager thus to complete their examination of those regions in which they have already won so much distinction.

Touching Australia, the only event of importance which has transpired since we last met is, I regret to say, of a very sorrowful nature. The Leichhardt Search Expedition, to promote which the Society contributed 200*l.*, had crossed the continent from Victoria to the head of the Gulf of Carpentaria, when its experienced and enterprising leader, Mr. Duncan McIntyre, was struck down by an endemic fever, and died after a few days' illness. This sad

event will not, however, put an end to the search, as a successor has been appointed in the person of Mr. Campbell.

In concluding these brief observations, I beg to congratulate you on the completion and erection of an obelisk to the memory of that great and successful discoverer, the lamented Speke. Cut off, alas! as he was before he received those honours to which, with his companion Grant, he was so justly entitled, it is gratifying to know that his numerous friends and admirers have been enabled, by the Queen's special permission, to place this memorial in one of the avenues near the broad walk of Kensington Gardens. I invite you to inspect this obelisk, which, like that also erected by our private subscriptions to commemorate the noble daring of the French Lieutenant Bellot, who was lost in the search after Franklin, does great credit to Macdonald and Field, the well-known granite-workers of Aberdeen.

This mention of the name of the renowned Arctic navigator, to whom I was so deeply attached, and to whom I wished "God speed" when he left our shores for the last time, in 1845, prompts me to announce to you that the uncovering of the fine statue, by Mr. Noble, which was unanimously decreed to his memory by a vote of Parliament, will take place on Thursday next, at half-past two o'clock.

When I inform you that Sir John Pakington, as First Lord of the Admiralty, has most willingly assented to the request to attend, made to him by myself, in the name of all geographers, and particularly in that of the many gallant Arctic naval officers and explorers who are Fellows of this Society, I feel certain that you will desire to congregate around the monument on this touching occasion, and thus cheer up Lady Franklin by a fresh proof of your high estimation of the great deeds of her illustrious husband.

The Paper of the evening was the following:—

1. *On the Recent Journey of Mr. W. H. Johnson from Leh, in Ladakh, to Ilchi in Chinese Turkistan.* By Major-General Sir H. C. RAWLINSON, K.C.B., M.P., &c.

SIR HENRY C. RAWLINSON said the journey of Mr. Johnson was a most remarkable one, not only for the boldness with which it was undertaken into an almost unknown country, many hundred miles distant from the British frontier, but for the scientific precision with which the places traversed were made known to us, and without which exploration in unknown countries lost half its value. Mr. Johnson was born and bred in India, and, having received his

education at a school in one of the hill-stations, was very early engaged on the Great Trigonometrical Survey, and instructed by Sir Andrew Scott Waugh and other officers of the Survey. In that position he showed so much ability that he was afterwards intrusted with the direction of various subsidiary works. It was whilst carrying out one of these operations, on the extreme northern limits of the territory of the Maharajah of Kashmir, that he was enabled, at the invitation of the Khan of Khotan, to perform the remarkable geographical exploit now under consideration. The territory up to the mountains which limit Turkistan on the south, belongs to the Maharajah of Kashmir; that is, to the Hindoo chief of Jummoo, the son of the famous Gholab Sing, to whom, at the conclusion of the Punjab war, we granted Kashmir and its dependencies. The inhabitants of Tibet are Buddhists; those of Kashmir are principally Mahommedans; whilst the people of Chinese Turkistan are Turks of an old stock, speaking the Jaghatai Turkish to the present day: they are Mahommedans of a somewhat bigoted character, but intelligent and rather good specimens of the Turkish race. The city of Ilchi or Khotan had been visited by no Europeans except Marco Polo, Benedict Goetz, and a few Jesuit missionaries in the last century, who were attached to an expedition sent by the Emperor of China to subdue the Eleuths of Zungaria. Chinese Turkistan is generally called "the Province of the Six Cities," from the six great marts which it contains; namely, Kashgar, Yarkand, Aksu, Yenghi-sheher, Ilchi, and Oosh-Turfan. Ilchi is important as being on the line of one of the great commercial routes between Russia and India. For a long time there has been an active commerce between the Russian frontier and India; that is, from the great Russian mart of Semipalatinsk, by a road which comes down through Aksu to Yarkand and so on to Kashmir. And this route crosses the trade road from Persia and Bokhara to China, *viâ* Kashgar and Yarkand. So that although Ilchi would lie on the straight road between Russia and India, the route by Yarkand has been usually found more convenient, the excess in actual distance being compensated for by all the routes converging on that point. This would explain how it is that the city of Ilchi has remained up to the present time so little known and so very rarely visited. Recent travellers between Russia and India had indeed passed in its vicinity, but no one had actually reached the city in question in the present century but Mr. Johnson. Dr. Thomson was the first British traveller who had crested the Karakorum. The brothers Schlagintweit had afterwards advanced from the Karakorum as far as Pushia, a hundred miles to the south of

Ilchi, but did not reach the city. It was necessary to make this remark, as it had been asserted on the Continent that they had really anticipated Mr. Johnson in the discovery (as it might be termed) of Khotan. For this feat, indeed, the Schlagintweits had received from the Russian Emperor the honorary title of Sakunlunski, that is, "he who has penetrated beyond the Kuen-lun." But, if they really merited that title, Mr. Johnson ought to receive the superior titular distinction of "Sailchiski," because he had penetrated not only beyond the Kuen-lun, but beyond Ilchi, a much more creditable and difficult task. In ancient times Ilchi was the high place of the Buddhist religion in Central Asia; in the fourth century, indeed, the famous Chinese pilgrims found fourteen convents in the city, each of them containing 3000 devotees. In its vicinity, too, there was said to stand one of those magnificent Buddhist temples which excited so much wonder in those days, an edifice which was traditionally believed to have taken eighty years in building. It was a rich and wonderful place for objects of art, and celebrated as a sanctuary throughout the whole of Central Asia. All that had passed away, and the neighbourhood was now almost a desert. Till within the last few years the country had been in the possession of the Chinese; but, owing to the shock which that empire had received through the war with England, the whole of these Turkistan states had risen in rebellion, and thrown off the Chinese yoke. The neighbouring city of Yarkand is at present in a state of anarchy, and Mr. Johnson gave an amusing account of the offer which the principal inhabitants had made to him whilst at Ilchi to take possession of the place on behalf of the English. A large inroad of people had taken place from the Jaxartes and Khokan, driven thence by the advance of the Russians: these refugees had pressed eastwards and had occupied both Kashgar and Yarkand; recently indeed they had also endeavoured to possess themselves of Khotan. The consequence was that the whole country was in a state of anarchy and confusion, and it was impossible to say what would be its fate. This state of things had produced a favourable opportunity for opening up relations, especially commercial relations, with these Turkistan states; the supplies which they used to receive from China having been cut off, and the Khan of Khotan, who had formerly travelled through India and become an admirer of British rule, having shown himself most anxious to cultivate trade with us. Mr. Johnson gives the following description of the Khan:—

"The Khan Badshah, of Khotan, is about eighty years of age, of good stature and appearance, and about six feet in height; rather stout, but well built, and of very fair complexion. He is seen to great advantage when dressed in his robes of state, which consist of a choga of silk, worked over with gold-thread,

and a large white turban, tied after the Mogul style. He is reported to be very ill-tempered and very strict in his government. I must, however, admit that he showed me much kindness while in his country, and kept all his promises, with the exception of not allowing me to leave the place after a stay of four days, as had been agreed upon; and in wishing to keep me altogether, which he would have done, had I not pointed out to him the uselessness of his doing so. He wished to detain me as an hostage, until such time as the British Government sent him assistance, in the shape of troops and arms, against the Khokanees or Andajanees and the Russian forces, which latter are daily approaching towards Yarkand and Khotan. On his return from Mecca, through India, in 1863, he was made the chief Kazi of Ilchi, and within a month he succeeded in raising a rebellion against the Chinese, which resulted in their massacre, and his election by the inhabitants of the country to be their Khan Badshah or chief ruler. The province of Khotan was the first in which the Chinese were destroyed, and the example was followed in Yarkand, Aksu, and other cities."

The difficulty of communication between India and Central Asia had hitherto been not merely physical, but political; and a great obstacle still exists in the right maintained by the Maharajah of Kashmir, whose territory lies to the south, and includes the mountain-passes into Turkestan, of levying transit duties: these, indeed, are so high that they almost paralyse commerce. Mr. Johnson, however, describes a road, practicable for wheeled carriages throughout the year, which passes from Ilchi into India, to the east of the Maharajah's dominions. If this information prove true, it will be one of the most valuable results of Mr. Johnson's expedition. The road is called the Polu road, and passing to the east of the Kuen-lun chain, turns through Rudok, towards the south. Mr. Johnson's words are:—

"The usual route from Leh to Ilchi is over the Karakorum Pass and through Sanju; but there are several others which, however, have not been much used till very lately. These are, the Hindotash diwan, the Brinnga diwan, and the Polu route. The last of these is the best, as it lies over vast plains where water, grass, and wood are obtainable at every halting-place. It is reported that wheeled conveyances may be taken from the Changchenmo Valley and Rudok to Ilchi and Yarkand by it; the only difficulty which exists is, that a portion of the route passes across the Chang-thang plain, which is occupied by shepherds, from Rudok, who closed the road last year to travellers proceeding from Leh and Ilchi. . . . This route though circuitous has many advantages over the others, the chief of which are, that wood, grass, and water are obtainable at every stage; that the road passes over no rugged and high snowy ranges, like the Sarsil and Karakorum passes, that it is safe from robbers; that it leads not only to Ilchi and Yarkand, but also, *via* Lob, to the large and important city of Karakashar, situated about 300 miles north-east of Ilchi, and which, with numerous other places of note, are occupied entirely by Kilmak Tartars, and are on the high road from Kashgar and Ili to Peking. By this route, the highly valued Ustarfani shawl-wool (superior to the Changthang) which is produced from the goat found in the Aktag or Thian Shan range of mountains, and a variety of other merchandize, may be brought down in large quantities for the Punjab and English markets. At the present time there is

an excellent opening for exports from India, because all trade between China and the Mahomedan States of Central Asia is at a complete standstill."

Mr. Johnson's route on his journey from Leh, whence he started in July, 1865, was by Tikse and Tañksi to the Pangong lake, thence over the Masimik Pass (18,990 feet) to the valley of Changchenmo; northward from this over the Lumkang Pass (19,533 feet) into the elevated plateau which extends hence to the Kuen-lun range; the first plain of the plateau being 17,300 feet above the sea-level, and containing large lakes, one of them 60 square miles in extent, and the second plain sloping for 30 miles in a north-easterly direction from 16,700 to 15,300 feet. At the northern end of these, he arrived on the banks of the Karakash River of Turkistan, at a point 15,500 feet above the sea-level. From this place to Ilchi occupied sixteen days' march, at the commencement of which he crossed the Khatai diwan (17,501 feet) and Yangi diwan (19,092 feet) Passes of the Kuen-lun, and descended to Brinja. The positions of all these places, as well as of Ilchi and Kiria, were fixed by observations, and a map constructed in India, from Mr. Johnson's plane-table. The altitude of Ilchi was found to be 4329 feet; the latitude $37^{\circ} 8' N.$, and the longitude $79^{\circ} 25' E.$

Mr. Johnson remained in Ilchi sixteen days; returned to Kashmir by the Karakorum route, by way of Zilgia, Sanju ($37^{\circ} 3' 57'' N.$ lat., and $78^{\circ} 29' 30'' E.$ long.), the Sanju diwan Pass (16,763 feet), Shadula ($36^{\circ} 6' 15'' N.$ lat., and $78^{\circ} 29' 30'' E.$ long.), the Karakorum Pass (18,317 feet), Yapshan and Khardong to Leh, reaching the latter place on the 1st of December, 1865.

Sir Henry concluded by saying he was sorry to see, by the Indian papers, that this communication of Mr. Johnson with the Khan of Khotan has been rather rebuked by the Government. Of course, he had no authority to enter into any political relations, but being in the place, he could hardly avoid receiving such communications when they were addressed to him. He had not committed the Government in any way. All that we should do at present with reference to Khotan, or to any of the potentates in Chinese Tartary, would be to cultivate friendly relations for the purposes of trade. He thought all must be prepared to admire, not only Mr. Johnson's great intrepidity in venturing alone on such a journey, but also his address in getting away from Khotan, which was a much more difficult matter than getting there. We were further indebted to him for having availed himself of every opportunity which offered for improving our geographical knowledge of the country, by obtaining observations wherever he could; and where he could not obtain observations, by keeping his plane-table, at any rate, with

such accuracy as to enable our geographers, on his return to the provinces, to fill in the whole of the mountain country, and to connect this important position of Ilchi with the great Trigonometrical Survey of India. There were many other matters connected with the subject that he could speak upon, if it were desired. He especially alluded to the political questions connected with Central Asia. If there was any wish to hear what his views were on the politics of Central Asia, he should be happy to communicate them in a few words; but he would not venture to volunteer them, as the subject was not immediately connected with the objects and duties of the Geographical Society.

Mr. Johnson's Paper and Map will be published in the 'Journal,' vol. xxxvii.

The PRESIDENT said that, long as he had presided over the Society, he had never heard a paper which more completely developed the character of a true, bold, and scientific manager of an expedition than this paper of Mr. Johnson. He thought, too, that without the admirable commentary of Sir Henry Rawlinson, most of those present would have been lost in an unknown world; and he, therefore, would connect the name of Sir Henry Rawlinson with that of Mr. Johnson, in asking them to return their thanks for this communication. It was now his duty to call upon gentlemen to offer some observations, even in opposition, if that were possible. Lord Strangford had long resided in Constantinople, and had made himself acquainted with those countries, and certainly no man in the room was better qualified to be the first to rise and speak upon such an occasion.

LORD STRANGFORD said, instead of opposing Sir Henry Rawlinson, as the President had invited gentlemen to do, he was rather in the position of Oliver Twist—disposed to ask for more; and, as Sir Henry Rawlinson had promised more on the subject of politics, it would ill become him to say anything upon that point. With regard to the paper, he did not hesitate to say that it was one of the most important papers that had ever been read before the Society. Our previous knowledge of the country had been in outline; but this was a filling-in of the picture, and the commentary of Sir Henry Rawlinson was the frame in which the picture was set. The bare facts communicated in the paper were most striking. The political fact was neither more nor less than the complete break-up of the Chinese empire, as regards its external dominions. Concerning that country, we were slaves to the map-maker's conventionality of a "Mongolia." Now, there was no Mongolia; the Mongols, from whom the comprehensive term was derived, were merely a nomadic population, wandering over a single portion of the so-called country. The settled and cultivated part of it was the Turkish part, which lies along the rivers that converge from the interior faces of the inclosing ranges. All that country which forms Chinese Turkistan is said to have cast off the Chinese yoke and to be entirely free, and, more than that, to be eagerly anxious to enter into commercial relations with the rest of the world. More particularly is this the case with the chief of Khotan, who has travelled through India, and who only wants to put an end to the monopoly of the Maharajah of Kashmir in order to to enter into commercial relations with India by this important carriage-road that had been described. Those two facts—the political fact and the commercial fact—were in themselves sufficient to constitute this paper one of the highest importance. Sir Roderick Murchison had alluded to his having

resided at Constantinople, and having a knowledge of the East. The only observation he could make upon that was, that a resident at Constantinople, who has any knowledge of the Turkish language, has only to walk down the main street of Constantinople, and converse with the wild Tartars whom he will meet there gathered from all parts of Central Asia, to realise to himself the extent to which these countries are thoroughly and essentially Turkish. He will comprehend in a living way that from Constantinople to Yarkand in one direction, and from Constantinople to Tobolsk in another, the Turkish language is spoken in every town and village. There is no common political or literary union, but the fact shows the enormous spread of the Turkish race by conquest, and it is a fact which cannot fail to be realised by any one at Constantinople. With regard to the geographical part of the question, the problem of Central Asia was, Where did Tibet end to the north? and what became of the Kuen-lun range of mountains ultimately? We had no European knowledge beyond what we had heard from the Jesuit missionaries. In the work of Abbé Huc there was not a geographical fact from beginning to end; Mr. Bryan Hodgson, who had read a paper before the Bengal Society, has given the names of the stations and the number of the passes between Nepaul and Pekin, from the itineraries of the tribute-bearing embassies; but beyond that there was absolutely nothing at all. With regard to the Revolution, he wanted to call attention to this circumstance, that there seemed to be a regular Mohammedan movement in progress everywhere in Central Asia. As far as he could make out, the Tungais, who are most probably of the Chinese race but of the Mohammedan religion, seemed to have all the fervour and "go" of the early Mohammedans; and it really looked as if the future of Chinese Proper were in their hands. Sir Henry Rawlinson mentioned that Mr. Johnson had met with a rebuke. He could not understand this. Mr. Johnson had achieved an extraordinary geographical feat, one of the greatest value that it was possible to conceive; and he could not understand how it was that Mr. Johnson should meet with rebuke. He did not understand why, instead of discouraging them, the Indian Government did not encourage its subordinates to visit those countries where there was now no difficulty in Englishmen going; and he would appeal to the Geographical Society whether, if we persistently neglected the present opportunity of going into a country thus thrown open to us, it would not be most unpardonable remissness on our part.

Mr. J. CRAWFURD having also eulogised Mr. Johnson's paper, said he did not think so much of the Turks as Lord Strangford did. Like all other Asiatics, they are capable of advancing to a certain point, and there they stood still. As warriors, and sometimes as governors, they had been very successful. They conquered the Greek empire, and they conquered India. But what else had they done in India or in Europe? In India they had not the skill to propagate their own language; they gave way to a people who invaded India in a much smaller degree—the Persians, and even adopted the Persian language, dropping their own. With respect to the great trade that was expected to spring up, the country, though a large one in extent, is a very poor one in point of fertility. He wanted to know what the Turks had to give us? He should like to submit a sample of their cotton to a Liverpool broker. But what had they got besides cotton? They seemed to have a great deal of gold, which he would advise them to get rid of as fast as possible. He hoped Sir Henry Rawlinson would name a few of their productions.

Mr. TRELAWNEY SAUNDERS said, in addition to the obstacle presented by Kashmir to the development of any communication with the countries to the northward of India, we have had difficulties distinctly interposed by the Chinese Government upon our own frontier, especially in the direction of the great road opened up to Shipki, on our frontier. He should like to know

whether any steps had been taken to remove those obstacles? And with regard to the insurrection which has broken out in the cities that form the western portion of the Chinese province of Ili, divided into the northern and southern circuits of the Celestial Mountains, he should like to know if that insurrection has extended to the other six cities which lie to the eastward, four of which formed a portion of one of the eighteen provinces of China? As to the productions of the countries described by Mr. Johnson, they constitute the largest pastoral region on the face of the earth; and he believed, if we could only secure free communication, there would be no difficulty in bringing down into India such an outpouring of wool as would speedily affect our Australian markets. He must ask that the next time an expedition was got up for the purpose of penetrating across the Himalayas that it would not meet with official rebuke. We wanted to develop friendly intercourse with these warlike and pastoral peoples of Central Asia, and to encourage trade with them. He hoped the President and the Society would encourage, and not discourage, expeditions of this kind.

The PRESIDENT said Mr. Saunders might be quite sure that the President of the Geographical Society would never discourage, but on every occasion encourage such explorations.

Sir HENRY RAWLINSON observed that the list of products given by Mr. Johnson was not very remarkable in a commercial point of view, because very few of them would be fitted for export. He says "the whole country, especially the Kuen-Lun range of mountains, is wealthy in minerals, viz., gold, silver, iron, lead, copper, antimony, salt, saltpetre, soda, and coal; of this last I have samples. It is found near the village of Duá in Khotan, and to the west of Yarkand, on the road to Kashgar. Gold and precious stones are chiefly found in the beds of the streams which issue from the Kuen-Lun range, and in very large quantities about Karangotak, Kiria, and Chira. It is said that 3000 men are daily employed in the gold-fields. The ordinary value of gold in Khotan is 9 to 10 rupees per tolá, while in Kashmir the same quantity sells for 17 to 18 rupees; this circumstance alone will show how abundant gold is, and how large a quantity there must be at the present time in the country." These are products of the country immediately around Khotan. In other parts of Turkistan, especially in the valleys of the Jaxartes and Zer-Afshan, cotton is the main article of produce, and it is supplied largely to Russia. In fact, the great object of the Russians recently has been to convert Khokan and Bokhara into a cotton-producing country exclusively, with the view of supplying the Russian manufactories with the raw material, to be sent back worked up into textile fabrics suited to the wants of the country. But besides cotton, raw silk is produced in large quantities. The country also supplies a considerable number of horses, carpets, wool to any extent; and in the valley of the Jaxartes many spots are declared to be favourable to the cultivation of madder, indigo, rice, sugar, and opium. The metallic resources of the country are enormous; and from Khotan is procured entirely the supply of jade, which is so much valued in China. All these articles certainly entitled the country to some consideration as a producing country. With reference to what Mr. Saunders had said about the Chinese frontier, he wished to explain that the route from the Niti pass by Shipki crossed only a small corner, from twenty to thirty miles, of prohibited territory. There had been negotiations about it, and he understood that the transit trade in future, from the end of the Hindostan road on to Ghartûp, would pass free over that portion of Chinese territory. At any rate, in the present disorganised state of Chinese Tartary, the Pekin authorities were not in a position to keep up those restrictive regulations on the Indian frontier which had hitherto paralysed commerce; and he expected very shortly that there would be complete free-trade between India and Central Asia. The article which would pay now was tea. The Moham-

medans of that country could not live without tea; and owing to the present disturbed condition of affairs, the tea trade from China was entirely cut off. With regard to the state of Zungaria, our last accounts referred to the city of Kuldja. All the Mohammedan cities were, one after the other, throwing off their allegiance. The fighting at Kuldja extended over two years. Kuldja was the Chinese capital of the country, and was situated just within the Chinese frontier to the eastward of the Balkash Lake. The war ended in the withdrawal of the Chinese, not only from Kuldja and the dependent cities, but from the whole province. And with regard to the lower cities of Khamil and Karashar, he believed the Chinese power to be so broken that it would have to withdraw completely to the Great Wall. It was very important, politically considered, that the country should be thus thrown open. He did not believe there ever could be the slightest danger of collision with Russia in this direction across Turkestan. With so many other lines open, no army would ever think of attempting to force a way, not only across those great barren plains of Turkistan, but across the enormous mountain-belt extending from Karakorum to the Punjab, where you have a succession of passes varying from 15,000 to 19,000 feet in height. It is the most impassable of any part of the north-western frontier of India; consequently, the most unlikely to be the scene of any collision between the two empires. He believed both nations might trade with perfect safety with the cities of Chinese Turkistan. The Russians have long had it so much at heart to open a trade with that country, that the principal commercial concession they demanded in concluding the treaty of Peking was the right to establish consuls and factories at three different points; at Kuldja, at Chuquchak, and at Kashgar. He confessed he should very much like to see English and Russian consuls established in those cities, for the mere purpose of trade, and without any political power. It would be for the benefit of the country itself, and for the benefit of the trade of the two European empires; also, it might tend to promote good feeling and honourable commercial emulation between them.

The PRESIDENT, in closing the meeting, said he entirely approved the concluding observations of Sir Henry Rawlinson, inasmuch as there could be no risk of war between Russia and ourselves in consequence of our exploring and trading with these countries.

Second Meeting, 26th November, 1866.

SIR RODERICK I. MURCHISON, BART., K.C.B., PRESIDENT, IN
THE CHAIR.

ELECTIONS.—*James Burgess, Esq., M.R.A.S., &c.; Roderick W. Cameron, Esq.; Commr. Manuel Jennaro Carrillo (Peruvian Navy); William Chandless, Esq., M.A.; John Collinson, Esq., C.E.; J. Howarth Clark, Esq.; Lord Edward Clinton, M.P. (Capt. Rifle Brigade); Fitzwilliam Dick, Esq., M.P.; W. C. B. Eatwell, Esq., M.D. (Surg. H.M. Indian Army); Edward St. John Faviman, Esq., F.G.S.; William Felkin, Jun. Esq., F.Z.S.; Commr. Thomas B. Hanham, R.N., &c.; Patrick Henderson, Esq.; John Minett Hockley, Esq., R.N.; Henry Kopsch, Esq.; Henry Maudslay, Esq.; A. J. Mundella, Esq.; Frederick Peel, Esq.; Edwin Ransom, Esq.; Richard Proctor Sims, Esq., C.E., &c.; Rev. Dr. James Stewart; Edward*

C. Taintor, Esq.; John Thomson, Esq.; Robert Richard Torrens, Esq.; Francis Young, Esq.

ACCESSIONS TO THE LIBRARY SINCE THE LAST MEETING, NOV. 12TH, 1866.—‘*Recherches sur la Longitude de la Côte Orientale de l’Amérique de Sud,*’ par M. E. Mouchez. ‘*Report on the Bar and Navigation of the Douro,*’ by Mr. Consul Crawford. ‘*Eisenbahn- Post- und Dampfschiffs- Karte von Europa,*’ von Dr. H. Lange. ‘*Les Polynésiens et leurs Migrations,*’ par M. de Quatrefages. All presented by the Authors. ‘*L’Empire du Milieu,*’ par M. le Marquis de Courcy. Added to the Library by purchase. ‘*Guide du Baigneur et de l’Etranger à Aix-les-Bains.*’ ‘*Notice sur les Chamettes, et sur les Environs de Chambéry.*’ ‘*Relation d’un Voyage à Bruxelles et à Coblenz, 1791.*’ All presented by S. M. Drach, Esq. Continuation of Journals, &c., &c., &c.

ACCESSIONS TO MAP-ROOM SINCE THE LAST MEETING.—Map of Asia Minor, by P. de Tchihatchef, during the years 1847 to 1863; compiled by Dr. Kiepert, and presented by Dr. Petermann. Map of the Central Province of Ceylon, exhibiting the Coffee-plantations, by J. Van Cuyhnturg, 1835; presented by C. R. Markham. Ordnance Maps, 1230 sheets, accompanied by 65 Area Books.

Previous to the Paper of the evening, the following letter from Dr. Livingstone was read:—

“Ngomano, 18th May, 1866.

“When we could not discover a path for camels through the mangrove-swamps of the mouth of the Rovuma, we proceeded about 25 miles to the north of that river, and at the bottom of Mikindany Bay entered a beautiful landlocked harbour called Kinday or Pemba. The entrance seems not more than 300 yards wide, and of these about 150 are deep; the reef on each side of the channel showing so plainly of a light colour that no ship ought to touch. The harbour is somewhat of the shape of the ‘spade’ on cards, the entrance being like the short handle. There is nearly a mile of space for anchorage, the southern part being from 10 to 14 fathoms, while the north-west portion is shallow and rocky. It is a first-rate harbour for Arab dhows, the land rising nearly all round from 200 to 300 feet. The water is so calm, Arabs can draw their craft to the shore to discharge and take in cargo. They are also completely screened by the masses of trees growing all round it from sea-ward observation.

“The population consists of coast Arabs and their slaves. The six villages in which they live are dotted round the shore, and may contain 300 souls in all. They seemed to be suspicious, and but for our having been accompanied by H.M.S. *Penguin* would have given trouble. The ordinary precaution of placing a sentry over our exposed goods caused a panic, and the sirkar or headman thought that he gave a crushing reply to my explanations, when he blubbered out, ‘But we have no thieves here!’

“Our route hence was s.s.w. to the Rovuma, which we struck at the spot marked on the chart as that at which the *Pioneer* turned in 1861. We

travelled over the same plateau that is seen to flank both sides of the Rovuma like a chain of hills from 400 to 600 feet high. Except where the natives, who are called Makonde, have cleared spaces for cultivation, the whole country, within the influence of the moisture from the ocean, is covered with dense jungle. The trees in general are not large, but they grow so closely together as generally to exclude the sun. In many places they may be said to be woven together by tangled masses of climbing-plants, more resembling the ropes and cables of a ship in inextricable confusion than the graceful creepers with which we are familiar in northern climates. Trade paths have already been made, but we had both to heighten and widen them for camels and buffaloes. The people at the sea-coast had declared that no aid could be got from the natives. When we were 7 miles off, we were agreeably surprised to find that for reasonable wages we could employ any number of carriers and wood-cutters we desired. As they were accustomed to clearing away the gigantic climbers for their garden ground, they whittled away with their tomahawks with remarkable speed and skill. But two days' continuous hard labour was as much as they could stand. It is questionable whether any people (except possibly the Chinese) who are not meat-eaters can endure continuous labour of a kind that brings so many muscles into violent action as this work did. French navvies could not compete with the English, until they were fed exactly like the latter. The Makonde have only fowls, a few goats, and the chance of an occasional gorge of the wild hog of the country.

"Little can be said about the appearance of the country. By the occasional glimpses we got it seemed covered with great masses of dark green foliage, except where the bamboos gave a lighter tint, or a *sterculia* had changed its leaves to yellow in anticipation of winter. The path we followed sometimes went along or across a 'wady,' in which we were smothered by the grass overhead.

"Such rocks as we could see were undisturbed grey sandstone, capped by ferruginous conglomerate. Upon this we often stumbled against blocks of silicified wood, so like recent wood that anyone would be unwilling to believe at sight that they were stones. This is a sure indication here of coal being underneath, and pieces of it were met in the sands of the river.

"When about 90 miles from the mouth of the Rovuma, the geological structure changes, and with this change we have more open forest, thinner vegetation, and grasses of more reasonable size. The chief rock is now syenite, and patches of fine white dolomite lie upon it in spots. Granitic masses have been shot up over the plain, which extends in front all the way to Ngomano, the confluence of the Rovuma, or Louma, and the Loendi. In the drier country we found that one of those inexplicable droughts had happened over the north bank of the Rovuma, and a tribe of Mazite or Mazitu, probably Zulus, had come down like a swarm of locusts, and carried away all the food above ground as well as what was growing. I had now to make forced marches with the Makonde in quest of provisions for my party, and am now with Matumora or Machumora, the chief at Ngomano, and by sending some 20 miles to the south-west I shall soon obtain succour for them. This is the point of confluence, as the name Mgomano or Ngomano implies, of the Louma and the Loendi. The Loendi is decidedly the parent stream, and comes from the south-west, where in addition to some bold granitic peaks, the dim outline of distant highlands appears. Even at that distance they raise the spirits, but possibly that is caused partly by the fact that we are now about 30 miles beyond our former turning-point and on the threshold of the unexplored.

"I propose to make this my head-quarters till I have felt my way round the north end of Lake Nyassa. If prospects are fair there, I need not return, but trust to another quarter for fresh supplies, but it is best to say little about

the future. Matumora is an intelligent man, and one well-known to be trustworthy. He is appealed to on all hands for his wise decisions, but he has not much real power beyond what his personal character gives him.

"The Makonde are all independent of each other, but they are not devoid of a natural sense of justice. A carrier stole a shirt from one of my men. Our guide pursued him at night, seized him in his own house, and the elders of his village made him pay about four times the value of the article stolen. No other case of theft has occurred. No dues were demanded, and only one fine—a very just one—was levied. Attempts have been made to make the Arabs pay, but they have always been resisted.

"So much has been said about Arab proselytism, that it was with interest inquiries were made about their success in converting the Makonde to the Mahometan faith. Here as elsewhere no attempts to teach had been made. Some Arabs asserted that it would be useless, for the Makonde had no idea of a Deity. On making inquiries about the gum-copal digging, I was shown a tree from which the gum was actually dropping, but they do not dig under the trees at present living. They choose the vicinity, in the belief that near to the modern trees those which yielded what is now considered fossil-gum must have grown. Here they dig; 'and,' said the spokesman, 'the first and second days we may labour in vain, but God may give it us after that.' To this acknowledgment of a Deity all responded. 'It is as He wills it.'

"The experiment with the buffaloes and Tsetse has not been satisfactory; one buffalo and two camels died. Had we not been in a Tsetse country, I should have ascribed this to overwork and bruises received on board the dhow which brought them from Zanzibar. These broke out into large ulcers. The symptoms were not those I have observed in oxen and horses. When stung by gadflies, blood of the arterial colour flows from the punctures. This may be the effect of the Tsetse, for when an ox known to be bitten was killed, its blood was all of the arterial hue. I had but four buffaloes for the experiment, and as three yet remain, I am at present in doubt.

"I write this short sketch in haste for an Arab who is passing down to the coast.

"DAVID LIVINGSTONE."

The PRESIDENT remarked that every geographer must be deeply interested in the ultimate result of this great expedition. The first point which Dr. Livingstone had to determine, after establishing a good base of operations, which he had succeeded in doing by making a friend of the influential chief of Ngomano, and ensuring supplies, was to advance to the northern end of Lake Nyassa. Afterwards turning to the north, he would endeavour to set at rest the question of the hydrography of that region. His object was to ascertain whether the waters flowed out of the Lake of Tanganyika towards the south, as Burton and Speke seemed to think when they examined that lake; or whether it might not turn out the reverse, namely, that the Lake Nyassa was completely closed to the north, and that the waters of the Tanganyika communicated northward. If he reached that lake, he would descend it in boats, to build which he had taken carpenters with him. When Burton and Speke were on the Tanganyika, they were both in extreme ill-health, and almost blind; so that their observations were necessarily imperfect, and the altitude of the lake, which they had fixed at about 1800 feet, had been very much doubted. There were geographers who thought the lake lay at a greater elevation; and as it was in the meridian of the vast lake discovered by Baker they conjectured that there might be a communication between the two. This was the great problem which Livingstone had to work out; and if it should be solved in the way suggested, then the lake Tanganyika would prove to be the ultimate head of the water system of the Nile. From Livingstone's well-known per-

severance and determination, and his success in making friends with the natives, he (the President) had every confidence that he, of all men alive, was the man most able to solve these difficult problems.

Colonel PLAYFAIR said the port north of the mouth of the Rovuma, which Livingstone had described, was one of which he had no personal knowledge; he should not, however, be surprised to hear of other harbours being discovered along that coast, for it had been most imperfectly surveyed. Only about a year ago an excellent harbour had been found by the Sultan of Zanzibar on the mainland, opposite the island; and he was now endeavouring to build a town there, but it is more than doubtful whether the experiment will succeed.

The following Paper was read:—

On the Physical Geography and Climate of Natal. By R. J. MANN, Esq., M.D., F.R.G.S., Superintendent of Education in Natal.

THE author exhibited numerous diagrams and maps in illustration of his subject, with a view to show how the peculiar climate and fertility of Natal depends upon its physical configuration. The colony is a portion of the narrow bevelled rim of the African continent, whose vast interior is an elevated table-land, with its coast presented to the moist winds of the Indian Ocean, and its interior frontier formed by the Drakenberg mountain-ledge, 7000 to 9000 feet high. In the northern part of the colony this mountain-ledge curves inwards, and from this hollow or bay the waters are gathered into one large river, the Tugela. From the salient point of the angular line of the Drakenberg, a mountain ridge projects into the middle of the colony, forming a high central backbone, from which short lateral spurs jut out. Each deep valley between these fingered ridges and to the south has its stream, and no less than fifty separate rivers find their way to the coast. These two distinct river systems of the colony—the one-rivered and the many-rivered—were necessarily caused by the zigzag direction of the great interior mountain frontier. There is a general slope upwards from the sea towards the interior; the gradient for the first 70 miles being 1 in 70. Up this slope the sea-breezes, impelled by a combined trade-wind and monsoon agency, blow almost continually, but most strongly in the summer, owing to the greater power of the sun on the land at this time, and it is in this season that most rain falls; the moisture-laden air, on reaching the heights, being no longer able to retain its humidity, discharges it in almost daily showers. Thus all the summer long the heat is tempered by clouds and the land fertilized by constant rains. During the winter, on the other hand, when the monsoon agency is at its least, there is almost perpetual sunshine and the weather is dry. The summer rainfall, as

the author had ascertained during eight years' observation, is about 24 inches; the winter rainfall only 6 inches. The temperature in summer commonly rises to 85° at midday, rarely to 97° , and at night very seldom descends to 52° . In winter it rises to between 70° and 80° , and rarely descends to 40° . There were five slight frosts in the eight years. The result of this peculiar climate, dependent on the geographical position and configuration of the land, is that sugar, coffee, arrow-root, pine-apples, bananas, and oranges, can be grown on the coast, whilst wheat, potatoes, and other food-crops, cattle, horses, and sheep thrive on the uplands, and Indian-corn and tobacco grow everywhere, the whole colony being only equal in area to one-third of England. The produce of the colony for one year, a year since, was 700 tons of sugar, 62,000 lbs. of coffee, 115 tons of arrow-root, 20,000 bushels of wheat, 500,000 bushels of Indian corn, 23,000 lbs. of tobacco; and there were then 290,000 cattle, 170,000 sheep, and 15,000 horses on its hills. The author explained the physical causes of the formation of the harbour of Natal, and gave many details of the mineral and vegetable productions of the country.

The Paper will be published at length in the Journal, vol. xxxvii.

The PRESIDENT, in returning thanks, said he had never heard a paper read which more clearly established the connection between climatology and geographical outline than this of Dr. Mann. It was Sir John Herschel who had induced Dr. Mann to make these accurate meteorological observations, extending over a series of years, and the paper communicated the results, in their connection with the physical geography of the region. Many persons might make observations of this description, but there were few who could put them together in such a philosophical form; and still fewer who could develop their knowledge with so much eloquence as Dr. Mann had done in this *vivâ voce* exposition of his subject.

Mr. CRAWFURD said he was very sorry he had little to object to in the eloquent discourse of Dr. Mann. His description of Natal was a great deal too attractive, it was enough to induce people to go there headlong. The climate, which was sub-tropical, was unequalled in the world; it surpassed that of Australia for salubrity and beauty. At the same time he thought Dr. Mann had overrated the fertility of the country. Arrow-root seemed to be the principal produce of Natal. Now the most valuable produce of a sub-tropical climate with an excellent soil would be sugar and coffee and not arrowroot. Again, nothing had been said about sheep and wool; and nothing about the vine. The country ought to produce tolerably strong wines. There were two other great defects of the colony, which Dr. Mann had discreetly passed over; there was not a single good harbour on the whole coast, that would admit a ship of 300 or 200 tons; and there was not a single navigable river.

Captain TOYNBEE said that the Mozambique current, which runs down between Madagascar and eastern Africa throughout the winter at a temperature of 78° , seemed to him to be the chief cause of the tropical climate of the coast districts of Natal. The reason why this tropical climate did not exist

on the western coast of Africa in the same latitude was, that at the same season of the year, the temperature of the sea is not greater than 50° .

Dr. MANN replied that if he had not been limited by the time allowed for his paper, what he said would have saved his friend Mr. Crawford from the necessity of asking these questions. The fact with regard to arrow-root was, that when the colony was first settled, men began to grow arrow-root before they were aware that they could produce more valuable articles. However, nine-tenths of those who began with arrow-root had abandoned the cultivation, and had turned their attention to sugar, coffee, and other things; and it was only in a few small corners of the country that arrow-root was now grown. With regard to the vine, he was surprised at Mr. Crawford's inquiry, because he had been giving them the results of a laborious investigation which showed that the summer at Natal is a summer of wet; therefore it would not answer, commercially, to grow the vine at Natal, for, to ripen the grapes easily, abundantly, and certainly, a dry summer is required. With regard to harbours, he had himself gone into the harbour of Natal, in vessels of 600 and 700 tons; and there was a vessel of 800 tons burden, now about to sail, that would have to go over the bar, unimproved as it is. The only difficulty was that ships of large burden could not pass over the bar except with a high tide; they were then tugged over by a steamer, occasionally just scratching the sand with their keels. But these difficulties would be got rid of by improving the harbour; and if his friend would give him 250,000*l.*, he would guarantee that a ship of 2000 tons should be able to enter the harbour within three years. It was entirely a question of outlay. With regard to sheep, when he first went out, nine years ago, he could not get a bit of mutton on his table; there was nothing but beef and antelope. Luckily, just at that time, it was discovered that sheep could be reared in the uplands; the result was that when he left the colony, a few months since, he could send to his butcher and get any amount of mutton he pleased.

Mr. CRAWFORD.—At how much per pound?

Dr. MANN.—At $6\frac{1}{2}d.$ and $7d.$ a lb. for the haunch and saddle. He was confident that, with a large amount of enterprise in the uplands, before another five years had passed, they would have 500,000 to 600,000 sheep. The other productions of the colony were numerous, they could really grow almost anything. Tobacco succeeded everywhere; beet-root in the uplands grows perfectly well; flax was grown with success; and they had grown cotton also with success: the only difficulty being that, up to the present time, labour was too costly for the cultivation of cotton in a general way. In many places the soil is so good that several crops are taken in succession off one piece of land without manuring. Three crops of oats have been produced from the same land in one year. With regard to Captain Toynbee's observation, it was true that something of the tropical condition of the coast did arise from the warm current from the north-east. Natal not only had the sun shining on its slopes, but it had a hot-water apparatus expressly provided to bring down additional heat. This, however, is certainly in Natal merely a subordinate influence. The coast climate is not largely dependent upon it. The proof of this is found in the fact that the sea-breeze is always refreshing and cool; and that the waters of Natal are crowded with fish. The Mozambique current does not come in close to land in Natal parallels.

Third Meeting, 10th December, 1866.

JOHN CRAWFURD, ESQ., F.R.S., VICE-PRESIDENT, in the Chair.

PRESENTATIONS.—*William Lane Booker, Esq. ; W. C. B. Eatwell, Esq., M.D. ; and Rev. Thomas Wiltshire.*

ELECTIONS.—*Capt. H. Hamilton Beamish, R.N. ; William Lane Booker, Esq. (H.M. Consul, San Francisco) ; William Debenham, Esq. ; William Græme Dick, Esq. ; William George Larkins, Esq., F.S.S. ; Robert James Mann, Esq., M.D. ; Henry M. Simons, Esq. ; William Parker Townson, Esq. ; Sir John E. Eardley Wilmot, BART.*

ACCESSIONS TO THE LIBRARY SINCE THE LAST MEETING, NOV. 26TH, 1866.—*Donations.* ‘*Meteorologische Waarnemingen in Nederland en Zijne Bezittingen en Afwijkingen van temperateur en Barometerstand op vele plaatsen in Europa intgegeven door het Konigklijk nederlandsch Meteorologisch instituut.*’ Utrecht, 1852–62. ‘*Meteorological Observations made at Pietermaritzburg during the year 1865,*’ by Dr. Mann. ‘*The Official Gazette of the Institution of Hydronomical and Nautical Engineers.*’ A. W. Adams, Esq. ‘*Tide Tables for the British and Irish Ports.*’ Admiralty. ‘*Übersicht der Thatigkeit der Nicolai-Hauptsternwarte, etc.*’ St. Petersburg. Otto Struve. ‘*Eisenbahn- Post- und Dampfschiffs- Karte von Europa,*’ von Dr. Henry Lange. Berlin. ‘*Guide du Baigneur et de l’Etranger à Aix-le-Bains,*’ presented by S. M. Drach, Esq. ‘*Notice sur les Charmettes, et sur les Environs de Chambéry, 1824,*’ *ib.* ‘*Relation d’un Voyage à Bruxelles et à Coblentz, 1791.*’ ‘*Boletim dos Annaes do Conselho Ultramarino.*’ ‘*Nautical Magazine.*’ ‘*The Alps of Hannibal,*’ by William John Law, M.A. ‘*First and Second Reports on the Plains and Rivers of Canterbury, New Zealand,*’ by W. T. Doyne. ‘*Report on the Bar and Navigation of the Douro,*’ by Mr. Consul Crawford. ‘*Relatizioni dei Consoli Veneti nella Siria.*’ Italian Ambassador. ‘*Selections: Records Bombay Government.*’ ‘*Revue Maritime et Coloniale,*’ Ministre de Marine, Paris. ‘*Mémoires de l’Académie Impériale des Sciences de St. Pétersbourg.*’ ‘*Transactions of the Historic Society of Lancashire and Cheshire.*’ ‘*Comptes Rendus Hebdomadaires des Séances de l’Académie des Sciences.*’ ‘*Mémoires de la Société des Sciences Naturelles de Strasbourg.*’ And continuations of Transactions, Journals, and Periodicals.

Purchases.—‘*Pomponii Melae de Chorographia libri tres.*’ Gustavus Parthey. Berlin, 1866. ‘*Histoire Naturelle des Glaciers Suisses,*’ by Grouner. Paris, 1770.

ACCESSIONS TO MAP-ROOM SINCE THE LAST MEETING.—Six sheets of

Fullarton's Atlas of England and Wales, on a scale of 4 miles to an inch; presented by the Author. Three sheets of Stieler's Hand Atlas; presented by Dr. A. Petermann. Admiralty Charts, 32 sheets, presented through the Hydrographer, Capt. G. H. Richards.

The following Papers were read :—

1. *On the Physical Geography of the Lower Indus.* By Colonel
C. W. TREMENHEERE, R.E.
(Abstract.)

THE province of Sind extends from Mittee, on the north, where it joins the Punjab, to the sea near the mouths of the Indus; and consists of a continuous plain, varying in width, through which the river Indus passes. The physical aspect of this immense plain presents a very remarkable uniformity throughout—

1st. In the entire absence of channels for natural drainage.

2nd. In its almost uniform slope, both towards the sea, and away from the river-banks.

3rd. In its mineral character.

The slope of the valley, in a direct line to the sea, 330 miles, is 7·8 feet, or 9·3 inches per mile, and the lateral slopes on either side of the river are in many cases quite as much. The river, in fact, passes along a ridge, and is many feet above the land a few miles distant on either side of it.

The actual course of the river, measured on the map, is about 540 miles, and the surface slope during the inundation amounts to 4·78 of a foot, or about 5·7 inches per mile. The soil consists entirely of a very fine siliceous deposit, mixed with a variable proportion of argillaceous matter, with much mica. Such is the uniform fineness of the soil, that it is impossible to find a grain of sand in the plain as large as a pin's head.

The Indus, like other tropical rivers, is subject to annual inundation, the extent of which has been carefully registered for many years, both at Sukkur and Kotree. At the former place the rise from the low-season level amounts to from 13 to 15 feet, while at Kotree, though lower down the river, the rise is generally about 2 feet more.

The amount of silt contained in the river-water is remarkably great. From a series of careful observations made at Sukkur and Kotree, it has been ascertained that, at the height of inundation, the solid matter in the water amounted to about 43·6 parts in 10,000 by weight, and at the end of December to 17 parts. The discharge of the river at the former period is about 380,000 cubic feet per second, and at the latter about 68,000. Assuming a mean discharge

of 200,000 cubic feet, and that the solid matter amounts to 25 parts in 10,000, there would be $217\frac{1}{4}$ millions of cubic yards of solid matter carried to the sea in a year, sufficient to cover 70 square miles with a deposit a yard in thickness.

If the Indus, like an ordinary drainage-channel, had taken its course through the lowest ground in the valley, it would have passed down the still existing channel, called the Rhein, into the Eastern Narra, and by Nowacote to the Run of Cutch. These old channels are still of very considerable size, and it is an interesting question whether they indicate the course of the river, or of any of its branches at any former period.

The country between the Narra and the present course of the river contains many remains of old channels, some of which extend for many miles continuously, and have well-defined banks with a glacis on each side. They have, in many cases, very tortuous courses; but are straighter as they approach the sea. There are many of these old channels to the eastward of the present course of the river, while such marks are rare and indistinct to the westward; so that one is led to the conclusion that the river has gradually worked to the westward. There is, unfortunately, no very authentic map of the Eastern Delta or of the country south of Hyderabad, showing the course of the old channels referred to, which terminate in the Run of Cutch. It is possible that formerly the chief outlets of the river may have been by these channels; and that the accumulation of enormous deposit derived from the river in the Run, in conjunction with an upheaval of the land on the border of the Run, which there are grounds to believe took place in 1819, may have forced the river to form new channels to the ocean. The completion of the survey of the Eastern Delta, and the extension of the series of levels over a portion of the Run of Cutch, will probably throw light upon the point.

During the inundation, when the river is carrying a very large body of water, its course is much more direct than in its low state; when the water not only follows the course of the larger reaches, but winds from side to side, and round the extensive sand-banks left in the bed. The surface-slope is thus, by an automatic action, continually adapting itself to the varying amount of discharge: and I think it may be generally stated of rivers flowing through such plains that the larger the body of water, and the less the surface-slope of the plain, the more direct will be the course of the river; and, on the contrary, the sharpness of the bends of a large river, flowing through such a plain, will indicate the existence of a considerable slope. I infer, in this manner, that the valley of the Tigris,

above the marshes, must have a greater slope than that of the Indus. The general statement I venture to make is that, with a fixed or virtually fixed maximum discharge, and an ascertained difference of level between any two points on a large river passing through an alluvial plain, the length of the river's course is also absolutely fixed. The longer, therefore, a river becomes by extending its delta to seaward, the greater tendency will there be to assume a more direct course.

The Delta commences about 7 miles south of the old town of Tatta on the right bank. The Buggaur and the Suttah (called the Hujamree near the sea) leave the river from the right bank, and the Mootnee and the Mull from its left. There are thus only five channels by which the river discharges into the sea.

The Western Delta has been recently surveyed by Captain Macdonald, and my map has been reduced from his survey, and accurately represents the district. The coast will be seen to extend in nearly a straight line from the mouth of the Hujamree to the entrance to Kurrachee Harbour, and is formed by a line of sand-bank topped by low dunes. The coast to seaward is extremely flat, and the extent of shore left dry at low water is very considerable. Behind the screen formed by the coast-line there is a very large area of marsh-land, permeated in every direction by tortuous creeks and channels, the tidal water to supply which is derived from a number of wide but shallow openings on the coast-line. These openings have been most improperly called mouths of the Indus; but it is obvious that they are, in fact, merely passages for the tidal water to and from the lagoon. Within the lagoon the channels are well defined, though very tortuous, and deepen gradually as the distance from the Indus increases. The soundings in those to the northward are as much as 3, 4, and $4\frac{1}{2}$ fathoms at low water, at the distance of many miles from the sea. The mud-banks within this lagoon have now been raised nearly to the level of ordinary high-water mark, by deposits of mud on which mangrove and soda plants are the only vegetation. This mud is blue-black in colour, and very fine; but when dried it becomes of the same light-drab colour as the Indus mud.

The bay and harbour of Kurrachee are situated at the extreme northern end of this delta. The bay is formed by Manora Point, a natural hill consisting of clay-beds capped by conglomerate, at the southern extremity of a reef about 10 miles in length, by which it is united to the mainland, and on which the action of the surf, which breaks directly upon it, has formed a beach capped by a narrow ridge of blown sand.

The opening of the bay between Manora and Clifton is about $3\frac{1}{2}$ miles wide, but this opening is blocked by rocky islands in the centre, and by the island of Keamaree at some distance in the rear.

The entrance to the harbour, and the only navigable channel, is close to Manora: the anchorage extending from within the shelter of that point to opposite the western end of Keamaree. With the exception of this comparatively deep portion, and of two branches of no great extent, the whole space within presents, at low water, an area of extensive mud-flats, some of which are covered by mangrove-bushes. The tidal area is generally at a level of 6 or 8 feet above low water, or from 1 to 3 feet below high water at spring-tides.

The surface consists of a layer, from 3 to 6 feet thick, of stiff black mud formed of silt mixed with decayed vegetable matter, lying on a bed of sand of variable quality—in some places fine and very thick, in others coarser—containing sea-shells, or approaching gravel. The whole overlies a bed of stiff blue clay, which appears to be the natural surface. The superficial deposits extend from 9 to 25 feet below low-water mark. On examining the superficial deposits it has been found that the black mud, mixed with vegetable matter, is identical with that formed on the mud-banks within the lagoon which has been described. Its mineral character, as well as that of the fine sands below it, and the whole surface of Keamaree, is marked by the presence of a very fine white quartz mixed with mica, and is identical with the silt carried to sea in the waters of the Indus.

The agency by which the Indus silt is swept so far to the northward will be understood by referring to the map of the coast-line.

The South-west Monsoon breaks upon this coast early in May, and lasts without cessation until the middle of September: during the whole of which period a heavy surf beats upon the shore. It is precisely during this period that the Indus is discharging its flood-waters, so heavily charged with sand and silt. The direction in which the surf breaks is marked upon the map by a series of parallel blue dotted lines, which form a considerable angle with the general coast-line. The result of this oblique action of the sea-stroke, upon a coast exposed to winds which prevail continuously for so long a period, is not only to force matter held in suspension in the water, in the direction of the stroke, but, as explained by Sir Henry de la Beche, to produce a shore current. The manner in which the deposit in the lagoon, and within Kurrachee Harbour, has been formed, is extremely well described in the 'Geological Observer,' and it would appear that the whole shore-line, between the mouths

of the Indus and Manora, has been formed by the action of the sea-stroke forcing the sand and silt, discharged by the river, in the direction of Kurrachee Harbour.

The rise of the tides on this coast varies from 8 to 11 feet at springs. Their course is in a direction parallel to the coast-line: the flood-tide coming from the north-west, and the ebb running in the opposite direction. During the monsoon months there is a current in the offing, setting to the south-east, in a direction contrary to that along the coast, which has been described. Both currents are produced by the same cause, the action of the long-continued sea-stroke on a coast-line forming a considerable angle with the crests of the monsoon waves.

By the action of the current in the offing it is probable that much silt, which has been swept to the northward as far as Kurrachee Harbour, may be again carried to the southward, and be eventually deposited in the Eastern Delta channels, or carried into the Run of Cutch.

The action which I have endeavoured to trace must have a considerable influence in checking the growth of the Delta of the Indus to seaward: the surf of each successive Monsoon, exerting its immense power in removing any deposit which would otherwise tend to extend the channels by which the river discharges itself into the ocean. The progress of the delta to seaward is thus dependent upon the advance of the whole coast-line between the mouths of the river and Ghuzree, which must be extremely slow.

The paper will be published *in extenso*, with Map, in the Journal, vol. xxxvii.

Mr. W. P. ANDREW (Chairman of the Scinde, Punjab, and Delhi Railway Company) said that the importance attaching to the harbour of Kurrachee could only be comprehended when we kept in mind the vast extent of our Indian possessions, containing an area equal to the whole of Europe, without Russia, and a population of two hundred millions, and having almost every variety of climate and soil, producing in abundance the staples of our home manufactures, and the fact that there were only four seaports around the enormous circuit of the coast of Hindostan. Two of these were very bad, one being merely an open roadstead. Bombay was the best one, and, though Kurrachee had been decried in some degree by the author of the paper, he thought he should be able to prove that the gallant officer was wrong in his opinion, and that at Kurrachee also we possessed a valuable harbour. The route of the Indus had always been regarded by our statesmen, from the time of Sir Henry Pottinger to Sir Charles Napier and Sir Bartle Frere, as the most important political line in our Eastern possessions, and if an erroneous impression obtained of the deterioration of Kurrachee, the natural port of that route, it might deter its improvement for a considerable period. A few words stated to have been used at another meeting in this country lately, had produced a most depressing effect upon the inhabitants of Kurrachee, so much so that they had memorialised the Government; and he had no doubt that

Colonel Tremenhoe would regret that such statements had been made. For instance, it was reported that a million of money had been spent upon Kurrachee Harbour.* That was really not the case. A quarter of a million was spent in various improvements; but of that sum only 57,000*l.* was spent upon the work of removing the bar. Another statement was said to have been made, to the effect that the port was a decaying port. So far from this being the case, during the last ten years the commerce of the port had risen from 1,400,000*l.* to upwards of 4,000,000*l.* last year; † the municipal dues from under 4000*l.* a year to 24,000*l.*; and the population from 40,000 to 60,000; and there were new streets and houses more resembling those of an English town than any other town in India. These facts he had taken from official returns compiled under the authority of Government. How could any port give more striking proof of growing prosperity. Sir Charles Nicholson, however, and Mr. Markham, the gentlemen who were reported as having used the expressions unfavourable to Kurrachee, had since assured him that they had been erroneously reported: and they entirely disavowed the statements attributed to them. With regard to the engineering part of the question, it was not for him to enter into details; but it might easily be shown that the views of the gallant officer were quite erroneous. His own experiment with the bottles offered a singular confutation of his theory, for not a single bottle was found to have got into Kurrachee out of the thousand bottles which he placed on the surface of the water at the mouth of the Indus. They made the voyage in the direction of Kurrachee, and they might possibly have gone into the mouth of the harbour, but, according to the gallant officer's own statement, met another current which carried them away somewhere else. The only other point

* This was in an erroneous report of a discussion at a meeting of Section E at the British Association, Nottingham.—[ED.]

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ANNUAL TRADE OF KURRACHEE HARBOUR.

Year.	Imports.	Exports.	Total.
	£.	£.	£.
1843-44	121,150	1,010	122,160
1844-45	217,700	9,300	227,000
1845-46	312,900	40,500	353,400
1846-47	293,400	49,300	342,700
1847-48	287,872	154,730	442,680
1848-49	344,715	107,133	451,849
1849-50	419,352	114,378	533,731
1850-51	425,831	196,461	622,293
1851-52	489,220	244,222	733,343
1852-53	535,690	376,337	800,000
1853-54	508,793	376,310	885,103
1854-55	575,196	346,893	922,089
1855-56	629,813	604,440	1,234,253
1856-57	685,665	734,522	1,420,187
1857-58	1,081,100	1,078,100	2,159,200
1858-59	1,540,606	1,044,273	2,584,879
1859-60	1,712,752	947,336	2,660,088
1860-61	1,658,305	1,025,345	2,683,650
1861-62	1,593,670	1,372,884	2,966,554
1862-63	2,242,818	3,287,594	5,530,412
1863-64	2,474,737	4,188,073	6,662,810
1864-65	2,316,700	2,928,015	5,244,715
1865-66	2,019,550	2,792,793	4,812,343

that struck him in the paper related to the mica found on the bar. The mica came down from the Indus, and was, no doubt, mixed with the sand on the shore; it would, as a matter of course, mix with other sand and silt which came in when the South-west Monsoon prevailed. Regarding the facilities of entrance to the port, he could speak with some authority, inasmuch as he had, from his official connection with the undertakings which had been named, been concerned in sending 300 ships from this country to Kurrachee; and they had not lost any ship entering or leaving the harbour except one, and that occurred through the fault of the pilot, who had most improperly left the vessel during the night.

The CHAIRMAN said he held in his hand a table of the exports and imports of Kurrachee, and they corroborated what Mr. Andrew had stated. Considering that Kurrachee had no products of its own, the increase of trade was wonderful. It would be a matter of deep regret if the harbour of Kurrachee was lost to us, for he believed it was the safest and best harbour in all Western India, Bombay excepted.

Mr. W. PARKES said that the question raised by Colonel Tremeneheere, of a coast current which he supposed to be running from the mouth of the Indus northward, had always been considered to be connected with the prospects of Kurrachee Harbour, although Colonel Tremeneheere in his paper had drawn no definite conclusion to that effect. But the only logical conclusion which could be drawn from Colonel Tremeneheere's premisses was this, that the sediment brought by the coast current was gradually deteriorating the harbour, and that it cannot be very long before the harbour will be completely destroyed. Colonel Tremeneheere attributed very great results to the influence of this coast current. A bed of sand over the whole area of the harbour from 9 to 25 feet in thickness, mud-banks 3 to 6 feet thick on the top of this; a sandy island (Keamaree) 2 miles long, a quarter of a mile wide, and 10 to 20 feet above the sea level, a spit of sand running southward for 2 miles from its western extremity, and the harbour channel forming the anchorage itself, were all the work of the coast current. These were vast results, and if the cause which produced them were still in action, we must look for correspondingly large effects still being produced, and those effects cannot but be fatal to the permanency of the harbour. In justification of the generally accepted conclusion that Colonel Tremeneheere does connect his theory with the anticipated absorption of the harbour into the Delta of the Indus he would refer to the circumstances under which it was first promulgated. In the early part of 1864 he was on a visit to Kurrachee, under instructions from the Government to advise as to the conduct of some works for the improvement of the harbour which had been designed some years previously by the late Mr. James Walker with his assistance. These works were under the charge of Colonel Tremeneheere as Chief Engineer of the province; but he had from the first expressed himself as strongly opposed to their principle. Several conferences took place between them solely on engineering questions, without, however, any agreement being arrived at. At these conferences the coast current was never mentioned, and Mr. Parkes had no suspicion that any theory concerning it was held by Colonel Tremeneheere. Mr. Parkes made his report in March, 1864, and Colonel Tremeneheere made his in the May following. It was in this report that the coast-current theory was first promulgated, and it was done in this way. Colonel Tremeneheere asserted that Mr. Walker had been misinformed on many important points with regard to the physical characteristics of the harbour, but the only point cited in support of this assertion was the existence of this coast current. Even then, however, he abstained from saying more than that it was an important element. He did not say how it affected the question, and to this day he has never directly stated what effect it has on the general economy of the harbour. That it must be destructive of the harbour is a

conclusion which others have drawn—and, as Mr. Parkes submitted, inevitably drawn—from Colonel Tremeneheere's premisses. Now, Colonel Tremeneheere admitted that the existence of this current could not be made evident by direct observation; it could only be deduced from well-known physical conditions. The conclusion was therefore, so far at least as it affected the harbour, hypothetical, and Mr. Parkes met the hypothesis by a fact. The harbour is not filling up. A comparison of official charts made in 1838, 1849, and 1854, with the surveys made under his own directions in 1858, showed a maintenance of the same capacity throughout those twenty years. Local changes there might be, but no general deterioration. Again, old seafaring persons who had known the harbour for fifty years, never remembered it better than in 1858. It was, therefore, clear that there was no deterioration; and if deterioration be a necessary consequence of the hypothetical coast current, the hypothesis must give way. Colonel Tremeneheere would appear himself to have felt this inconsistency, for in his paper just read he had stated that the sediment brought by the coast current was carried back again by an offing current in the opposite direction. It was curious that this current was not mentioned in his first report; in his second report it was alluded to as well known to exist, but as having only a very slight bearing on the question; but now, in his paper just read, it was made the very salvation of the harbour. So far as it affected the harbour question, then, the coast-current theory was cancelled by the offing-current theory. But Mr. Parkes could not accept either theory, though the practical import of the first might be destroyed by Colonel Tremeneheere's late confession with respect to the second, and though the existence of this second current, at least in the immediate neighbourhood of the harbour, was indisputable. With regard to the theory itself, Colonel Tremeneheere thus explained it: that the action of the sea-stroke on a line of shore forming an oblique angle with the crests of the waves was to produce a coast current, and he cited De la Beche in proof of this position; but De la Beche says it is the wind and not the sea-stroke which produces the current, and the wind is shown by actual observation never to blow obliquely on the shore in question, but at right angles, and consequently no coast current would be produced. The sea-stroke would have a different action; it would drive sand before it, but would produce no current in the body of the water. And even with respect to the sea-stroke, late observations showed that it was not always, even if it were ever, oblique, for during the last Monsoon it was distinctly observed by competent witnesses to have a direction which would fall dead on to the shore. The very foundation of Colonel Tremeneheere's theory was therefore false. Colonel Tremeneheere had, however, adduced two facts in support of his theory which were worthy of notice. The first was the existence of mica in the mud-banks of the harbour, which mineral was only found in the valley of the Indus. But was it not natural that the sea water for many miles from the mouth of the Indus should have diffused through it minute particles of this substance, some of which it would necessarily deposit in all sheltered inlets? This proved nothing. The second fact was the result of an interesting but very incomplete experiment made by Colonel Tremeneheere during the Monsoon of 1865. He set afloat 864 bottles from the mouth of the Indus, and 214 of these, or about one-fourth, were found on the shore a few miles south-east of Kurrachee, none in or near the harbour, but all congregated in a remarkable manner at a distance of from 4 to 7 miles from it. This fact at first sight seemed to fit in well with the preconceived theory, up to a certain point, but a further examination showed it to be quite incompatible with that theory. These bottles were set afloat in the strong outset of the Indus during flood, when it runs 5 or 6 miles an hour. Was it to be supposed that immediately on emerging from the river-mouth they turned sharp round to the northward and followed the coast? Was it not far more natural to suppose that

they were carried far out to sea, and then drifted by wind and eddy currents back on to the shore? This latter supposition was much strengthened by the fact, that, of 216 bottles which were set afloat when the tide was rising and the outset consequently weak, only two stray ones were picked up, while of 144 which were set afloat in the hour and half after high water, when the outset was strongest and the course out to sea most free, no less than 75, or more than half, were picked up. Thus, then, though the gross result might at first sight seem to favour the coast-current theory, the first step in the examination of the details scattered it to the winds. Mr. Parkes was quite sure the onward progress of the port of Kurrachee would not be checked by Colonel Tremeneheere's coast current.

In answer to the Chairman, Mr. Parkes stated that the amount expended upon that portion of the works which had been brought to bear upon the entrance was 57,000*l.*, and not a million, as had been stated elsewhere. A further sum of 200,000*l.* had been expended upon internal works which would ultimately affect the entrance, but they did not do so at present. The 57,000*l.* had been expended in the construction of a bank of stone 2 miles long upon the Keamaree sand-spit. The object was to cut through the bar in a direct line with the main harbour channel; and though this was not yet accomplished, yet the bar had been reduced in width from 400 to 200 feet, and its crest lowered 3 feet. In the mean time the circuitous channel round the end of the bar had been widened from 600 to 1200 feet, so as to allow of a more direct course into the harbour. The works were as yet incomplete, and their anticipated effects still more so, but the entrance had never been in so favourable a condition as it was at present, though some temporary inconvenience from the changes in the channels had been felt two or three years ago.

Mr. J. BRUNTON (Chief Engineer of the Scinde Railway) said he had just returned from Kurrachee, where he had been a resident for nine years. He had watched very particularly not only the conformation of the harbour, but the works which had been going on under Mr. Parkes. Colonel Tremeneheere spoke of Manora Point as the western boundary of the Delta of the Indus. He thought the gallant officer was wrong, and that the Delta of the Indus must be considered to terminate at Ghuzree Point. That would place Kurrachee Harbour quite beyond the action of any current produced by the river Indus that might pass up the coast. He had had constant communication with Captain Giles, and with many officers of the port of Kurrachee, and they were all, without exception, of opinion that the current ran down the coast, and not up it; for all vessels, immediately they cross the bar of Kurrachee, are seen to be carried by the current at the mouth of the harbour down the coast, rather than up. With regard to the harbour works, two million tons of silt had been carried out of the harbour and thrown into the sea, at a cost of 6½*d.* per ton. The whole harbour had thus been deepened and enlarged. When he first went there, twenty large full-rigged ships would have found it difficult to swing at their anchors in Kurrachee Harbour. When he left a few weeks ago, there were thirty-one large square-rigged vessels in the harbour, able to swing without any inconvenience. That was a proof that the groyne which had been formed had improved the harbour.

Captain CONSTABLE (late Indian Navy) said he could corroborate the remarks of the previous speakers. He had the honour to serve twenty years in the Indian Navy, which all geographers would recollect had rendered itself rather famous for its surveys. He was in the surveying-ships fourteen or fifteen years, and a great deal of his surveying operations were on the west coast of India and at Kurrachee. In 1839 the place was looked upon as a creek almost unfit to take ships into; but since then it had gone on improving. There was evidently no silt carried into it. In 1854 he (Captain Constable) was engaged as assistant upon the chart of Captain Grieve. He drew that chart, and he

had the means of comparing it with the Government Survey made in 1838; and he found an improvement of nearly 2 feet more water on the bar and in the channel. Again in the present year, a book, entitled 'The West Coast of Hindostan Pilot,' had been published by the Admiralty, written by Captain Taylor, of the late Indian Navy, one of our most able surveyors: in this work he told us that it was reported there was a depth of 26 feet at high water on Kurrachee Bar. Now, there never was such a depth all the time he knew Kurrachee. All these facts showed that the harbour was improving, and that there could not be any silting-up in operation. With regard to the current, no north-west current had been experienced in the Monsoon; and Captain Grieve, in his 'Sailing Directions for the Coast,' published by the Bombay Government, said he was not aware of the existence of any currents beyond occasional sets to the south-east. He spoke of the offing, where ships navigate. He could also corroborate the fact of the south-west wind. Although called the South-west Monsoon, it was not south-west exactly; certainly not on the coast of Scinde, for there its general direction is w.s.w. In reply to the Chairman, Captain Constable said that he knew of no harbour on the west coast of India equal to Kurrachee, except Bombay.

Major-General Sir W. GORDON, R.E., said he rose in consequence of the absence of Colonel Tremenhœere, to state that the paper which had been read was drawn up by him in his official capacity as officer in charge of public works in that district. Not being satisfied with the works for the improvement of Kurrachee Harbour, he instituted investigations as to the physical geography of the lower part of the river. In his paper he had, with good taste, avoided disputed points of engineering; and it would have been in good taste if those gentlemen who had made an attack upon him had followed his example.

Captain MAURY said he was not prepared to discuss the question of Kurrachee, but he desired to do homage to a philosophical mind and thank Colonel Tremenhœere for the very capital paper that had been read. He thought the mouths of the Indus confirmed in their mute way the fact that there is a current there. From the information communicated that evening, it did not appear that the current, because it swept silt in the direction of Kurrachee Harbour, deposits it there, for the harbour appeared to be improving. There was no doubt there is a current, which carries the silt away as fast as the river brings it down. There was nothing more instructive upon this point than to compare the deltas of various rivers. Take, for instance, the delta of the Mississippi. The Mississippi pours down tremendous quantities of silt into still water; there is no current in the Gulf at that place, and the consequence is that the river carries out its bed into the Gulf of Mexico, and then makes a channel for itself on the top of the bed. If there had been a current there, that silt would have been swept away, as it is from the Indus, as fast as it was brought down. Again, if we turned to the Amazon, the Rio de la Plata, and other great rivers, we find there are currents that not only sweep away the silt as fast as it is brought down, but they cut away the mainland, and with their eddies scoop out and make large recesses into the land from the mouths of the rivers. The difference between the Mississippi and the Indus is this:—the Mississippi discharges its silt into still water; the Indus discharges its silt into running water. Whether the current from the Indus sweeps with more force to the south-east or north-west, the probability, according to the statements made by the gentlemen present, seems to be in favour of the south-east.

The CHAIRMAN expressed his regret that Colonel Tremenhœere was not present to defend his own theory, but he had had two able defenders. It was not the business of the Society to decide questions in dispute, like the present one; they had only to thank the writer of the paper, and also the gentlemen who had taken part in the discussion, for the valuable information they had afforded.

2.—*On the District of Lake Pangong, in Tibet.* By Capt. H. H. GODWIN-AUSTEN, F.R.G.S., Assistant in the Trigonometrical Survey of India.

THE author left Leh to survey the shores of Lake Pangong in July, 1863. North of the Indus, from its junction with the Dras river, lies a high range of mountains, which separates the Indus drainage from that of the Shayok or Nubra. The passes over this range are of great elevation; on the direct road from Leh to the Pangong Lake there are two: viz., the Chang La, 17,470 feet, and the Kay La, 18,250 feet above the sea-level. Having crossed the Chang La to the village of Tanksé, the surveying party proceeded along the valley leading to the western extremity of the lake. The stream which flows down the valley contains but little water, and the *talus* from the mountains partly blocks up the passage; the ridge of Surtokh, which forms the watershed across the natural exit from the Pangong is entirely formed of loose shingle, brought down a somewhat large lateral ravine. If the waters of the Pangong (which have now no exit) should reach the altitude they formerly attained, they would force a passage across this barrier.

A Trigonometrical station of the Indian Survey lies close to the water's edge, its height being 13,931 feet above the sea-level. The waters are of an intense blue colour, clear as crystal, but too saline to be drinkable. The author commenced his march along the southern shores on the 22nd of July. He pursued this route until he came to a point where the lake contracts to very narrow dimensions; he then crossed to the northern shore, and reached to within a short distance of Noh, a Tibetan town of the province of Rudok, where he was compelled to turn back, owing to the entreaties of the governor. Beyond the contracted part the lake again expands for a long distance; it then again narrows, and further east again expands into a fine sheet of water, the termination of which is unknown. The first, or lower lake, is 40 miles in length; the second 33 miles; and the upper, or easterly portion, at least 18 miles.

Captain Godwin-Austen communicated his observations on the physical geography of this remarkable lake, and showed that its waters must formerly have been fresh, and must have attained a much greater elevation than they do at the present time. Myriads of fresh-water shells now strew the shore, and lie so thick in some of the bays that they can be taken up by handfull. At present the waters are too salt to nourish a single molluscous animal. The lower lake does not contain in its waters or on its banks a vestige

of any kind of plant, although formerly there must have been a considerable vegetation, to sustain so much animal life. There are signs of the climate of the region having been formerly much more humid than it is now. The absence of streams whose waters find an exit in it is a curious feature; but there are numerous lateral valleys leading up towards the glaciers of the surrounding mountains, and the bottoms of the valleys near the lake are composed of beds of silt containing fossil shells, showing that considerable streams, bringing down detritus from the mountains, must formerly have flowed down them.

The Paper will be printed entire in the Journal, vol. xxxvii.

ADDITIONAL NOTICES.

(Printed by order of Council.)

1. *Letters from MR. GÉRHARD ROHLFS to SIR R. I. MURCHISON.**

SIR,

Schimmedru, Kauar, June 20, 1866.†

I have delayed up to the present time giving you notice of my movements, partly because I had hoped to be able to say something definite regarding my future destination, and partly because I had nothing remarkable to communicate.

Detained here for nearly two months on account of there being no caravan for Bornu, I have profited by the enforced delay in constructing, from information obtained from the Teda, a map of the Tu or Tibesti country, which I think will give a tolerably accurate idea of a country where no traveller has yet been. Precise accounts given me by Maiua Bu Bekr of the reigning family in Tibesti, and others agree in this, that Tibesti, or Tu, as the natives style it, calling themselves Teda, is a very mountainous country, on which account it is also called Tebu Kschadi, *i. e.*, furrowed by deep valleys. Nine of these valleys are of considerable extent and inhabited. The most northerly is Abo or Uro. Three days' journey to the southward of Abo lies Tao, beginning at Mount Tisri on the east, and extending, like the first-named, towards the west. Three or four days' journey to the east of Tao is Borde, coming from the south, and extending towards the north; this is a well-peopled valley, inhabited by the Tebu Tukta and Adeboka. Eastward of Borde lies Ausso, which also extends from south to north. Then there is Suar, three days' journey to the south-west of Tao, and lying south and north; Durso to the north, uniting with the Tao valley, which comes from the east; Marmar, three days' journey s.s.e. of Tao, and extending towards the south-west; Krema, south of Marmar, and finally Dirkemau on the Borgu road towards the south-east, seven days' journey to the south-east of Tao, which I

* See 'Proceedings,' vol. x. p. 69.

† Translated by the Assistant Secretary R.G.S.

have taken in all cases as the point of departure. The map which I have drawn according to their information, and which I have sent to Dr. Petermann, will probably be soon published, and it will give you a more accurate idea of the country than I am now able to do by mere description. I have besides succeeded in obtaining information of more than twelve new routes towards Tibesti, Borgu, Air, and other countries, which will tend to fill up the vacant places in our maps of the Great Desert.

I was received here at Kauar very ungraciously by his Tebugian Majesty, on account of my being a Christian, for since the Snussi sect have taken possession of the education of the Kauar people, they have become thorough fanatics. The Mahommedans have spread their religion with incredible rapidity towards the interior of Africa.

I hope I shall soon be able to decide whether my next march will be to Wadai or towards the south; in ten days probably I shall be able to start, either alone or by a caravan. We have had no news from Bornu for the last five months; some say there has been war in that country, and others that the Tuaregs have cut off the communication in making a razzia on Kanem. On this account no one is willing to undertake a journey southward from this place. Some days ago I hired a guide to accompany me to Kuka, for the exorbitant sum of 300 francs; but a little before the day fixed for our departure I was warned that he was a harami (highway robber). I had much difficulty in recovering my money, and did not accomplish it without losing a portion. To-day I am in treaty with another man, whose honesty and knowledge of the road are spoken of highly; but he demands 100 *thalleri*, more than 500 francs. I cannot, however, stay here for ever, and there is nothing especially attractive in this little kingdom in the heart of the Great Desert.

I shall send this letter *viâ* Mursuk to Tripoli, to the care of M. Rossi, the Austrian Consul, who takes charge of my correspondence.

GÉRHARD ROHLFS.

SIR,

Kuka, 15th August, 1866.*

I have the honour to apprise the Royal Geographical Society of my happy arrival in Bornu, on the shores of Lake Tsad. Received by the Sultan with his well-known affability, I have now great hopes of being able to penetrate from here to Wadai, although it appeared at first as if even this were vain to expect. It is quite certain that the Sultan of Wadai was innocent of the murder of Beuermann, for at the time that Beuermann was strangled in Mao the Sultan was in Bagirmi. The day before yesterday I had the honour of translating a letter of Lord Clarendon's into Arabic, and I failed not to emphasise the passage wherein the noble Lord begs his Highness to consult his own heart, and not to follow the malignant whispers of his counsellors. This letter had lain here for upwards of ten years without the Sultan being acquainted with its contents. We are now at the end of the rainy season, and the Tsad begins to get fuller. You have probably already learnt, through Petermann's 'Mittheilungen,' the interesting questions concerning *Tu* or *Tibesti*. I had hoped to have been able to go to Borgu with a caravan porceeding northerly: as yet I have found no opportunity of meeting with a single native of that country.

The roads being impassible I am prevented at present from leaving this capital: I shall probably be able to give you by next caravan more definite information about my departure for Uara. The insatiable courtiers of the Sultan of Kuka have left me very bare of money, so that I fear I shall not be able to show myself at the Wadai Court with proper dignity as a representative

* Translated by S. M. Drach, Esq., F.R.G.S.

of Christendom. The well-known generosity of the London geographers, whose active support I have known *thrice*, makes me hope that my present needs will not be disregarded. And if I fortunately arrive this year in the Wadai Sultan's capital, I hope to arrive in the summer of the following year in London, and give your learned assembly an account of my journeys. Being nearly certain of the success of my request to the Royal Geographical Society, I beg you to forward the money to *Tripoli*, in Barbary, to Mr. Consul *Rossi*, who will satisfy those persons of whom I have to borrow money here.

I also inform you of the very interesting and peculiar petrifications in the Ade-"dunes" and in the *Geis* mountains, through which my way led between Kaur and Kanem, and from which I brought several specimens. They are partly quite closed hollow stones, often filled up with sand, looking like vesicles, from the size of a pea to that of a fist, partly long tubes, hollow inside, of glassy sound, and partly leaves, which I at first took to be petrified fern-leaves, and afterwards for petrified intergrown "Had"-plants, *Anabasis alopecuroides*. I have since rejected this idea, and do not yet know what to think of these curious forms. I have collected many specimens of them, and the learned in this branch of science will probably decide to what class these strange forms appertain.

GÉRHARD ROHLFS.

2. On a new Harbour opposite Zanzibar.

(Extracts from a Letter of Dr. KIRK to Sir R. I. MURCHISON.)

Soon after my arrival in Zanzibar I had occasion to visit the mainland, in company with Captain Pasley, R.N., at whose disposal the Sultan kindly placed his steam-yacht for the trip.

Our object was to inspect a place on the coast a little to the south of Zanzibar Island, where His Highness proposes establishing a harbour for the convenience of vessels carrying off the produce of the interior. The point selected is in lat. $6^{\circ} 49' \text{ s.}$, and long. (on chart) $39^{\circ} 17' \text{ E.}$ It possesses great natural facilities, to which it is proposed adding buoys, to mark the passage, and a fort to give security. In the meantime a large body of slaves are engaged clearing a space for building, and the old corvette, *Victoria*, one of His Highness's ships, will be moored inside the harbour. Leaving Zanzibar about 10 A.M., we reached the harbour of Mozozima, or as it is now called Dar Salam, in time to have entered had we desired: we preferred remaining at anchor in the bay outside the reefs. This anchorage is well protected, by a group of small islands, from the south-west monsoon, and offers a most secure ground for ships of any size. These islands are called the Goonja: they are low flat spots, with steep or overhanging edges, from the constant action of the water on the coarse and loose tertiary sandstone of which they consist.

The following morning we passed up the harbour under steam. At a mile and a half off shore the reefs came together so as to leave only a narrow passage, in which, however, there is not less than $5\frac{1}{2}$ fathoms, so that any vessel visiting this coast could easily enter, if the two points of reef were buoyed. Once inside the reef the passage is straight and clear, deepening as we advance, and with 7 fathoms between the sand-heads, which slightly overlap each other and completely close the harbour, except for a small line s.s.w., where it is open. Within the northern sand-head there is a recess, where the ground has been cleared for the town.

To the south there runs a deep creek, one mile wide, with from 7 to 9 fathoms water, extending 4 miles, and shallower arms reaching still further. The banks of this natural and perfect harbour are steep, and about 30 feet high in some places, so that there is no continuous mangrove-swamp near the place. The

country beyond is smooth and flat, with a distant ridge of about 500 feet, seen in the distance, perhaps 10 miles off. The vegetation is such as we are familiar with in tropical Africa, but containing many new species, which on this occasion I had not time to collect. The baobab-trees, which were still in full leaf, indicated a much moister region than we find on the Zambezi, where during the cool months these trees are bare and leafless. While we remained there was always a pleasant cool breeze most refreshing to us.

When entering I had observed certain columns on the northern side, about a mile above the harbour mouth, and a small ruined edifice a few hundred yards further on, which had attracted my attention as being the only stone buildings visible. These are ascribed by the Arabs to the Portuguese, which seems quite improbable. To the old town the natives give the name of Bongoni. The ruined building consists of four walls, enclosing a space 8 yards long and 4 wide, placed north and south. In each of the three southern walls we find a doorway, while the north wall has an arch of carved stone within a square moulding. This arch opens to a semicircular recess, or chancel, having three tiers of niches cut in stone. Outside the southern gate there is a deep well of brackish water. This building seems to belong to the older Arab times, possibly before the East coast fell under the dominion of the Portuguese: this I conclude from the chancel pointing to Mecca, and not to the east. The columns proved to be very elaborately constructed, grand, obviously Moslem, and probably of more recent date. Some have very neatly cut Arab inscriptions, while others have old pieces of Oriental pottery inserted in the face.

The geology of the coast is extremely simple; the sea-face presents a section of 30 feet of the upper strata. Those on the top are of loose but stratified sand, full of existing species of marine shells. This is the general surface-stratum of the plain, covered with a layer of soil more or less thick; the marine-shells, however, showing wherever the sand comes to the surface. Under the sand we have a coarse stratified sandstone, also of marine origin, and tertiary or even post-tertiary date.

This tertiary band coats the East African shore, and was found by us extending up the valley of the Rovuma for 80 miles, where it met with the stratified but older metamorphic rocks. On this coarse grey sandstone is found silicified wood, but it must not be confounded with the older sandstones which overlay the coal, and which also have superficial silicified wood on them.

At Mozambique the island consists of this recent tertiary sandstone, cemented with much lime, the *débris* of shells and coral, while the opposite shore is of monoculiferous limestone, with sharks'-teeth and crustaceans.

The result of our expedition was to convince us of the value of this place as a harbour. Whether it will be able to draw trade from Zanzibar on the one hand, and the other coast ports, its rivals, on the other, is very uncertain.

3. *Land Journey along the Shores of the Persian Gulf, from Bushire to Lingah.* By W. H. COLVILL, Esq., Assistant-Surgeon, Bushire.

(Communicated by the INDIA OFFICE.)

[EXTRACTS.]

I TAKE the liberty of forwarding a brief account of the country travelled over in my land journey from Bushire, following the coast line, to the port of Lingah.

My party consisted of five private servants and two muleteers, with three horses and seven mules. I carried no tents and little baggage, so as to be enabled to move more easily. I experienced the greatest kindness all along the

road, but more especially in the Dashtie country, where the chiefs are wealthy and the people contented.

After crossing the marsh between Bushire and the mainland, I entered the northern end of the plain of Khormuj. This plain or valley is about 15 miles wide at the upper end and 65 miles long: it lies north and south. The margins are cultivated with date-trees, and there are numerous little villages at distances of from 3 to 6 miles. These villages consist of from thirty to fifty huts, made entirely of date-leaves plastered over with mud, and there is generally a square tower either of stone or mud in the centre of every village. The chief towns of the plain are Aram, Khormuj, and Kakee. Khormuj is the principal residence of Hyder Khan, chief of the Dashtie country. It consists of about 150 stone or mud built houses, occupied for the most part by the followers of the chief. The fort is large and new, and the rooms are richly decorated in the style of Shiraz. Besides the usual quantity of mirrors, gilding and painting of flowers, nightingales, wild animals, and Persian beauties, on a panel of a door in one of the chief rooms is the double-headed eagle of Russia. A small stream runs from the hill down to the town, and drives a number of flour-mills.

The town of Kakee is the residence of Jamil Khan, chief of a sub-district of Dashtistan. It is twice the size of Khormuj, but not so well built. The fort in process of construction is very fine. The river Charactagh, rising in regions about Shapur, and passing through Khona Zuneon near Shiraz, runs within 30 miles of Ferozabad, and opens into the plain of Khormuj round the north of Khoe Namik, between it and the low sandstone range. It passes across the plain and opens into the sea at Khore Ze-arad, where it enters the plain of Khormuj: it is 120 yards wide, and on the day I crossed it it was $3\frac{1}{2}$ feet deep; but it was said then to be unusually low, for at this season it is almost always necessary to cross it on a raft. It is here called the River Moon, and even now it is slightly brackish. Vessels of forty or fifty tons ascend it almost opposite to Kakee. A natural canal of brackish water, 12 yards wide and 2 feet deep, called the Shura, passes from near the hill of Aram down the centre of the plain and opens into the Moon. The plain of Bussaaf is triangular in shape. Its northern side is bounded by a range of sandstone of considerable height, which runs straight and unbroken from Khoe Namik to the village of Tumbak, and its southern side is bounded by a low sandstone range, which stretches from a spur of Jibbul Dring to the village of Berdistan. Along the northern side of this plain are a few villages and date-trees. There is no place of any size in the plain, but 3 miles south-west from the village of Berdistan, just round the end of the low sandstone range, is Deyer. This is a village of about 100 stone houses and a number of huts. It has a large fort with four towers, two right-angled, one six and the other ten sided. The whole has rather an Oriental appearance. It is governed by a wife of Hyder Khan. The lady is called Fatu; but she has adopted the name of her son Jamil Khan, of Boordakhoon, and uses his seal. She writes, and it is said makes a very good governor, having no objection to show herself to her own people, though she hides her face from strangers. Grain is the chief export of this place, and it is almost all carried in from the surrounding country on camels belonging to Jamil Khan, of Kakee, who has about 1500. This year 200 horses were brought from Shiraz by Khormuj, and embarked here for Bombay, as there is no custom-house. The prosperity of Deyer dates from the destruction of Congoon seven years ago. Berdistan Creek is its harbour. Berdistan village has about fifty stone houses, with a fort built nine years ago by Hyder Khan, on the ruins of a former village, which was destroyed by Sheik Hassan of Gabendie. This same Sheik Hassan also twice burned Deyer. The fort has one or two rooms overloaded with gilding and paintings of women drinking wine. Bussaaf has no river, but a very small stream, called the Pario, comes from the range on the north and loses itself in the plain. The plain of Bussaaf is the

last of the Dashtie country, and on leaving it I got into the Arab districts under Sheik Muscure, of Gabendie, whose district extends from Bussaaf to the government of Hamerun. The population, with the exception of those of Assaloo and Nabend, call themselves Nasri or Nasreah Arabs.

My road now lay along the shore past Congoon, Tumbak, and Tahrie to Nakhl Taki. These villages form a sub-district under Gabendie, with Tahrie, the residence of Sheik Khatham, a younger brother of Sheik Muscure, as the chief town. At Tumbak, or Ayanat as it is called by the Arabs, the sandstone range from Khoe Namik ends by bending round a high limestone range which commences at this place. This limestone range is composed of masses pressed up one against the other so as to form a continuous range, having a general direction east and a little south, and stretching to the north of and past Lingah. Tahrie, said to contain 300 families, looks in a dilapidated state. The chief exports of the place are tobacco and charcoal, brought from the plain of Gillodar, and saltfish from the villages round. To the north of the limestone range behind Tahrie is a fertile plain, called Gillodar, about 60 miles long by 20 broad. It has fifteen stone-built villages, but no river. To the west of that, and separated from it by a low range, is a smaller plain, called Jam. This has a stream which rises in the hills, but is lost in the plain. The inhabitants of these parts are pure Persians, who do not understand a word of Arabic. From Tahrie there is a very good road through the plain of Gillodar, and past the village of Jaharan to Shiraz. A caravan takes eight or nine days.

The plain of Gabendie is bounded on the north by the limestone range which stretches eastward from Tumbak, and on the south by a low range of sandstone extending from Nabend Point along the sea-shore. Khooch Khonar is the largest of the villages, and contains about one hundred families. This is a great flax-producing district, and besides what is consumed in the country round, it supplies most of the fishing villages with material for nets.

Next to Gabendie comes the district of Hamerun. It is bounded on the north by the limestone range, and on the south by the sea. This district is small, and not highly cultivated, but its chief, Sheik Mahomed, besides being a farmer of revenue, is a manufacturer of gunpowder. Sulphur he brings from Bostanah, the saltpetre he gets near Be-de, bringing the crude mass to Hamerun, and there separating the nitrate of potash from the chloride of sodium by crystallisation. The charcoal comes from the hills. He sends all the gunpowder on camels to Lingah—two or three thousand pounds every year.

Bunder Khunderoon, or as it is perhaps as commonly called, from the name of the tribe inhabiting it, Meerazege, is under Lingah. It consists of 3000 houses, divided into many villages, which, hid by date-trees and patches of cultivation, lie round a salt marsh some 50 miles long. The inhabitants are Arabs and Wahabees, though they are not fond of proclaiming the nature of their religion on Persian soil.

It is curious to notice that all through Southern Persia, while the limestone ranges are clothed more or less with the almond, the dwarf oak, the hawthorn, the rose, and the terebinthinae, with springs welling out and little streams running down the hill-sides, the sandstone on the other hand produces scarcely a shrub and barely a grass, and the few streams that spring from it are generally brackish. Again, almost all the masses of limestone have a quaquaversal dip, while the contiguous sandstone has the strike parallel to the limestone range, with the dip away from it, as if the limestone, pushing itself through the sandstone, had raised it also. This is general in the low country, but on the tableland of Persia, where the sandstone and gypsum form hills of considerable height, the strata are as a rule horizontal, as if the upheaval had been sufficiently general to raise them without disturbing their original arrangement.

4. *On the Progress of the Russo-American Telegraph Works.*

(Extract from the 'Journal de St. Petersbourg,' September 28, 1866.)

Nous empruntons des nouvelles qui suivent, sur les travaux du télégraphe russo-américain, à une correspondance adressée de Guigiga à la *Poste du Nord*, sous la date du 2 août dernier :—

"M. Abaza est arrivé à Pétropavlovsk le 8 août, avec trois ingénieurs américains, dont deux, le capitaine Meyhood et le lieutenant Busch, furent immédiatement envoyés à Nicolaïevsk, pour exécuter des travaux d'exploration depuis l'Amour jusqu'à Okhotsk ; M. Abaza lui-même entreprit d'explorer, en compagnie du lieutenant Kennan, la presqu'île du Kamschatka, la terre de Koriatsk et le pays de Guigiga.

"Pour se faire une idée des difficultés contre lesquelles les deux détachements ont eu à lutter, il faut savoir qu'excepté le petit village d'Oudsk et le port, détruit aujourd'hui, d'Aïan, il n'y a, entre Nicolaïevsk et Okhotsk, aucun habitant, si ce n'est quelques TOUNGouses nomades. La traversée du Kamschatka en été, et à cheval, n'a jamais été accomplie par personne.

"Des comptes rendus officiels donneront probablement plus tard des détails sur l'expédition de M. Abaza et de ses compagnons ; nous dirons seulement que, malgré les difficultés incroyables qu'ils ont rencontrées à chaque pas, et surtout pendant leur passage à travers la chaîne du grand Tiguilsk, après avoir exécuté ce passage sur des chevaux inaccoutumés au transport des fardeaux, au milieu d'une cruelle tempête qui dura quatre jours, ils arrivèrent dans le village de Tiguil, après avoir accompli en 16 jours, au grand étonnement des habitants, un voyage de 1200 verstes. Nous ne parlons pas des épisodes nombreux de ce voyage, épisodes qui auraient pu se terminer de la façon la plus tragique.

"De Tiguil à Guigiga ils voyagèrent tantôt à cheval, tantôt en baïdars (barques en cuir), sur la baie de Penjinskaïa ; enfin, à l'entrée de l'hiver, ils continuèrent leur voyage en traîneaux attelés de rennes et de chiens, traversant les camps des Koriatskes et des Tchoukotskes nomades, et passant souvent la nuit en plein air, et couchés sur la terre, par 35 degrés de froid.

"Le 22 novembre M. Abaza arriva à Guigiga. Là il devait rencontrer le détachement d'ingénieurs qui se proposait de partir des bouches de l'Anadyr pour remonter en bateau cette rivière jusqu'à nos colonies sur l'Anadyr, et de là se rendre en traîneaux attelés de chiens à Guigiga, après avoir exploré le pays des bouches de l'Anadyr à la baie de Penjinskaïa. Cependant, non-seulement M. Abaza ne rencontra pas à Guigiga le détachement de l'Anadyr, mais il ne peut en avoir aucune nouvelle ; on dut se borner à supposer que les vaisseaux de l'expédition avaient tardé à arriver aux bouches de l'Anadyr, et avaient trouvé le liman de ce fleuve fermé par les glaces, ce qui arrive quelquefois vers le 20 août, et que par suite de ce retard le vapeur de l'Anadyr n'avait pu remonter le fleuve.

"Sans parler même de ce que l'arrivée du détachement de l'Anadyr eût renforcé le nombre des ingénieurs qui devaient faire les explorations nécessaires, M. Abaza comptait recevoir par eux une quantité importante de provisions alimentaires ; après son voyage de Kamschatka les siennes étaient épuisées. Mais par dessus tout il aurait voulu connaître l'issue de l'expédition de l'ingénieur en chef, M. Bulkley, au détroit de Behring.

"En tardant à arriver au point marqué, le détachement de l'Anadyr laissait entre les mains de *quatre hommes*, dont deux étaient sur l'Amour, tout le travail de l'étude et de la démarcation de la ligne suivant laquelle le télégraphe devait être construit, sur une étendue de 6000 verstes.

"A tout ce qui rendait ainsi assez difficile la ^{position} de M. Abaza et de ses compagnons venait s'ajouter l'incertitude où ils étaient par rapport au détache-

ment de l'Anadyr. Le détachement avait-il débarqué à l'embouchure de l'Anadyr, et comment avait-il été accueilli par les Tchouktchis, cette race sauvage et belliqueuse qui occupe une immense étendue à l'extrémité nord-est de la Sibérie? Bien que les Tchouktchis, que M. Abaza avait rencontrés à son passage dans la terre des Koriatskes l'eussent assuré du caractère pacifique (toutefois très-sujet à caution) de ceux de leur race, il était très-désireux de savoir dans quelle situation se trouvait le détachement, dans le cas de leur débarquement aux bouches de l'Anadyr.

"Bien que le débarquement des Américains, dans une saison avancée, ne nous parût pas probable, M. Abaza, qui connaissait le personnel de l'expédition, l'esprit entreprenant et énergique de l'ingénieur en chef, ne douta pas que le colonel Bulkley n'eût risqué de laisser quelques hommes à l'embouchure de l'Anadyr; le lieutenant Kennan fut envoyé avec quelques cosaques et quelques indigènes à la colonie d'Anadyrsk, pour recueillir des renseignements à ce sujet et continuer les travaux d'étude pour l'établissement du télégraphe.

"En même temps M. Abaza partit dans la direction d'Okhotsk et d'Aïana, pour frayer la voie par la chaîne du Stanovoï, et résoudre cette question essentielle pour la compagnie : fallait-il établir le télégraphe d'Okhotsk à l'Amour par la terre ferme, le long des bords de la mer d'Okhotsk, à travers des localités qui jusqu'à ce jour n'ont été explorées par personne, ou établir sur cette étendue un câble sous-marin.

"Nous avons déjà dit que nous ne pouvions entrer dans tous les détails de la marche de l'expédition, et nous dirons seulement ici qu'entre Okhotsk et Aïana le chef de l'expédition rencontra le capitaine Meyhood et le lieutenant Busch, envoyés de Pétrópavlovsk sur l'Amour. Ces ingénieurs et M. Schwartz avaient fait la route de Nicolaïevsk à Okhotsk accompagnés de Toungouses, et montés sur des rennes, et malgré ce moyen de transport horriblement fatigant, et leur voyage à travers des localités peu connues même des nomades, ils avaient réussi à remplir de la façon la plus satisfaisante la mission qui leur avait été confiée.

"Cependant le lieutenant Kennan apprit par des nomades, entre Guigiga et Anadyrsk, que sur la fin de l'automne deux navires, l'un à voile et l'autre 'de feu,' étaient arrivés à l'embouchure de l'Anadyr, et y avaient débarqué cinq hommes, qui y vivaient dans une hutte munie d'un poêle, qu'ils étaient fournis d'une quantité suffisante de provisions, et que, à leur débarquement, les Tchouktchis leur avaient promis de les transporter par le premier trainage à Anadyrsk. Pourquoi ne l'avaient-ils pas fait? on ne le savait pas.

"Aussitôt après son arrivée à Anadyrsk, le lieutenant Kennan partit, en traîneau attelé de chiens, pour les bouches de l'Anadyr, afin d'aller à la recherche de ses compagnons, et fit le premier cette route en hiver avec des chiens. L'été nos missionnaires s'y rendent souvent d'Anadyrsk par mer, pour y prêcher l'évangile; mais personne n'y a encore été l'hiver.

"D'Anadyrsk à l'embouchure du fleuve il y a 600 verstes, et pour faire le voyage aller et retour on est obligé de se servir des mêmes chiens, et encore d'emporter avec soi de la nourriture pour ces animaux (du poisson séché); il est impossible d'en prendre avec soi pour plus d'un mois, et, si dans cet espace de temps on ne parvient pas à revenir et à éviter les horribles tourbillons de neige, qui durent quelquefois pendant plusieurs semaines,—ce qui fait qu'il n'y a alors aucune possibilité de voyager, et que la nourriture des chiens s'épuise,—alors le voyageur n'aurait plus de secours à espérer, et une mort inévitable l'attendrait.

"Le lieutenant Kennan atteignit très-heureusement le lieu de débarquement des Américains, et ramena à Anadyrsk, avec tous leurs effets et toutes leurs provisions, les trois ingénieurs, qui vivaient dans une cabane bien organisée. Avant l'arrivée du lieutenant Kennan deux Américains étaient partis avec un parti de Tchouktchis, et n'étaient arrivés à Anadyrsk qu'en 64 jours. Nous

espérons que ces voyageurs s'empresseront de communiquer au public des détails sur leur long séjour au milieu des nomades, d'autant plus qu'excepté le capitaine Billings, qui a été vers 1780 à la terre de Tchoukotsk, personne n'a jamais pénétré dans cette contrée.

“Maintenant le chef de l'expédition est revenu de ses excursions lointaines, et a terminé ses travaux. Les travaux d'études sont entièrement achevés depuis Anadyrsk jusqu'à l'Amour, sur une étendue de 6000 verstes, et la direction de la ligne du télégraphe est arrêtée. Cet immense travail a été exécuté par le chef de l'expédition et trois ingénieurs, dans le courant d'un hiver horrible, durant lequel ils eurent à lutter contre d'incroyables difficultés, voyageant chaque jour à travers des déserts, tantôt à dos de rennes, tantôt avec des chiens, le plus souvent simplement sur des raquettes, et toujours avec de cruels ouragans et des froids affreux pour compagnons.

“Quand la mer d'Okhotsk sera libre, nous attendons ici l'arrivée de navires de la compagnie télégraphique, venant d'Amérique avec tout le matériel nécessaire pour commencer immédiatement les travaux. Ces navires nous amèneront des Yakoutes déjà loués pour les travaux, et ceux-ci seront poursuivis activement de l'Amour à la mer de Behring. Déjà maintenant, depuis Okhotsk jusqu'à Anadyrsk, les travaux sont commencés, avec le concours des habitants; ces travaux consistent à construire des maisons, à équarrir des arbres pour faire des poteaux télégraphiques, etc.

“Si l'on tient compte de l'activité persévérante et infatigable des constructeurs en chef du télégraphe russo-américain, on peut s'attendre à ce que d'ici à trois ans tous les travaux soient terminés, et à ce que nous, habitants de Guigiga, nous puissions féliciter par le nouveau télégraphe, non-seulement nos compatriotes d'au-delà de l'Oural, mais nos voisins d'outre-mer, de la fin de ce pénible et magnifique travail.”

5. *On the Routes between Orenbourg and Tashkend.*

(Extract from the 'Gazette de Moscou.')

“En partant d'Orenbourg pour se diriger vers les frontières de la Tartarie indépendante on rencontre le long de la route jusqu'à Orsk, sur une étendue de 280 verstes environ, les *stanitzas* très-bien construites des cosaques d'Orenbourg. A Orsk on quitte l'Oural et l'on entre dans la steppe des Kirghiz d'Orenbourg. Le premier point qu'on rencontre sur la route est la forteresse de Karaboutak, près de la petite rivière du même nom, que se jette dans la rivière Or. Cette forteresse, qui se trouve sur un rocher élevé, ressemble à un vieux château. Près d'elle se trouve un petit village russe. Plus loin on arrive à la forteresse Ouralsky, sur la rivière Irghiz, puis de là, à travers le Karakouma, au fort No. 1 (Kazala), et du fort No. 1 au fort No. 2 (Karmaktchi), distant de 187 verstes du fort Pérovsky. De ce dernier point la route de Tachkent passe par la forteresse de Djoulek, par Iani-Kourgan (renversée par nous en 1861) et Turkestan, et à partir de là elle se prolonge et se change en un joli chemin coupé par de fréquents cours d'eau qui descendent du Karataou pour se jeter dans le Syr.

“Ainsi, depuis Orsk, jusqu'à la forteresse d'Ouralsky, on suit presque constamment la rive de l'Or. Des compagnies innombrables de perdrix blanches volent auprès de vous comme si elles vous poursuivaient. De la forteresse d'Ouralsky on entre dans le Karakouma, et là on fait 400 verstes à travers les sables de la steppe aride et inhabitée, dans laquelle on rencontre des puits aux stations, dont l'eau est amère et salée.

“On rencontre la mer d'Aral à deux journées de marche avant d'arriver à Kazala, à la baie de Maïli-Bach, et on la voit de loin; là on rencontre quelque

végétation, mais pauvre. A partir de Kazala, on a pour compagnon de route le Syr-Daria. Tantôt en s'en rapprochant, tantôt en s'en éloignant, on suit sans la quitter la direction de cette rivière jusqu'au fort Pérovsky, sur une distance de plus de 400 verstes.

“ La marche d'un chameau chargé est ordinairement de 4 à 4½ verstes à l'heure; les intervalles des stations sont calculés dans la steppe de façon à ce que l'on ne marche point pendant la grande chaleur, avant le crépuscule on se met en route et l'on fait une seule étape jusqu'à dix heures du matin. A cinq heures après midi on repart de nouveau, et à onze heures on s'arrête pour passer la nuit. C'est ainsi que l'on fait des marches de plus de douze heures par jour et que l'on franchit à dos de chameau un espace qui n'est pas moins de 60 verstes.

“ Ce genre de monture n'est pas employé partout, mais à deux stations entre le Karaboutak et la forteresse Gural'sky, et quelquefois, en cas de nécessité, dans tout le Karakouma. Y compris les temps d'arrêt, on parcourt toute cette distance en six jours, et le septième au matin on arrive à Kazala, d'où l'on parvient en quatre jours au fort Pérovsky. Du reste, les relais de poste sont depuis longtemps organisés depuis Orsk jusqu'à Kazala; ils sont entretenus par les Kirghiz, et si ces derniers ne sont pas encore familiarisés avec le mode d'attelage russe, en revanche ils mènent vite. Dans le Karakouma, ils se servent le plus souvent d'attelages de chevaux.

“ L'ancien gouverneur-général d'Orenbourg, M. l'aide-de-camp général Bézack, a prescrit qu'à chaque station il y aurait un postillon russe pour familiariser plus promptement les Kirghiz avec le service russe des postes.”

6. *Last Letter of Mr. DUNCAN McINTYRE, Leader of the Leichhardt Search Expedition, and an Account of his Death.*

(Communicated by the COLONIAL OFFICE.)

SUBJOINED is an extract from the last despatch of Mr. McIntyre to his uncle, D. Campbell, Esq., and also a despatch from the second in command:—

“ Gregory River, 2nd May, 1866.

“ I wrote you about five weeks ago from the Gilliot River, sending a lot of accounts and other papers connected with the expedition. The dromedaries, horses, and men needed rest for a few weeks. I got another man, named McLeod, and two of the black boys Donald [McIntyre, the explorer's brother], brought over with the cattle and seven horses. On the 2nd April I started in search of further traces of Leichhardt, and also to call at the port to get some more rations.

“ Nothing of any consequence happened during the first week. We passed over splendid country all the way, until we entered the watershed of the Leichhardt River; the country there became rough and stony. It took us nearly a week, going straight west, before we got to the main branch, which we crossed and kept west for one day more. The country then was all but impassable; our horses not being shod could not stand it, so we had to turn eastward again to the main channel of the Leichhardt, which we followed down in three days, when we reached the settled districts, Kennedy and McDonald being the farthest out on the Leichhardt. We still kept the river until we passed the next station, 40 miles lower down; we then left it, and struck out north-west, and in about 50 miles arrived at T. G. McDonald's station on the Gregory. Here we were informed of the unhealthiness of the

climate, a man having died a few days before our arrival; his grave was quite close to the bit of a shed they called a hut. There being only two on the station, the survivor was unable to carry his unfortunate companion to any distance. We kept on down the river, and in due time arrived at what is called the township [Burketown] or port. The population was about sixty, forty-five or fifty being bad with the fever; in fact, people were sick everywhere. I could not count ten able to do anything in the shape of work. I camped at a lagoon about a mile from the town [Burketown], thinking that I was away from all the sickness. There were two tents near us. Next morning one of the men in the tents was dead; and, on going up to the township to get the stores away, I was told two more had died that morning. I got my stores and started up here, 16 miles higher up. While putting them into order for packing on the horses, one of the black boys got the fever, and this morning McLeod has it. The black boy, I think, will get over it; but McLeod thinks it is all over with him. I am all ready, only waiting for the men to get well. I hope in a few days they will get better; it does not last long, in a week one is either in one's grave or well again.

"Before I came here there were about eighty in the town, sixty-six of whom were bad with fever. I am told that twenty-five are all that have died in the town, and they are making up coffins for two more, who are past recovery. I hope I shall get away all right; people are leaving by sea and land, as fast as they can. There are two stores; flour, tea, and sugar in abundance, but of very bad quality—the flour we can hardly eat, as it is quite sour; and there are two public-houses. The present site of the town is on a plain only a few feet above the level of the sea.

"Perhaps there is something unusual in the atmosphere this season; but the natives of the country appear to be all right.

"We have met with no positive trace of Leichhardt yet; but we have ascertained beyond a doubt that whites are now, or have been, among the blacks within the last ten years. There is a boy and a girl, from ten to twelve years of age, almost white, with light blue eyes and red hair; and in another tribe, a girl about fifteen years of age; and in another a full-grown woman, perhaps eighteen years of age; and there is a rumour of a white man being within a day's ride of this, among a strong tribe of about two hundred; they are very fierce; none of the settlers have come to any terms with them yet. They will come out on the open plain, and fight to the last. I have been after this supposed white man already. I was accompanied by the officer in charge of the native police here; he had two troopers with him, I had also a black boy. We saw between thirty and forty blacks; but there was no sign of white men among them. We had to make prisoners of them all before they would allow us to see them properly. In order to have an interpreter, we took a young fellow with us to the police camp. He is now quite at home; in three or four months he will be able to speak a little English, when, if not before, we shall learn all about how the half-castes came among the blacks.

"The blacks are now all collected near the sea-coast between the Albert and Leichhardt rivers, with the white man or half-caste among them. They are said to be well armed, and give chase to all the whites that approach them. This, of course, I do not believe.

"I know they are mostly very bold, and stout able fellows. One of them nearly took the carbine from the officer, when we were out the other day. They have no fear whatever of fire-arms. As soon as I can get away tomorrow, or next day, perhaps, I intend going to where the blacks are, and camp somewhere there, until I find out all about who the white man is, or whether he is only a half-caste; but I am sure there is something in it. However, I shall learn about it in a few days. I think the officer and native police will go with me, as there is only myself and one black boy able to do

anything, and two are not enough to surround one hundred or more blacks, and disarm them, whereas five or six can do so without shooting any.

"We were camped for nearly two months among 600 blacks at Cooper's Creek. They were at times very troublesome, but we never had to shoot any, although they richly deserved it sometimes. We saw no blacks until we reached the tropics. We had no trouble with them. On this expedition we saw a good many, and traces of large tribes every day, especially at the head of the Leichhardt. We could get no information from any we saw, and had great trouble in getting near them; but once up to them they always considered themselves prisoners; I suppose from some custom among themselves. They are cannibals here and all the way up the east coast. I have seen no positive proof of their eating one another, but they have the same habits as those that are further eastward. I have had no time to examine many camps yet; those which I have searched contained nothing but what all wild blacks have: no sign of iron or any metal in any shape. The head of the Leichhardt, and also the western branches of the Flinders River, are a great harbour for blacks. They contain so many mountain passes, that a few natives could defend them against a regiment of soldiers. Mountains perpendicular for 600 and 800 feet, in some places narrower above than below [the mountain passes]. Except in the beds of the watercourses the country is quite impassable for anything; but a man without boots or shoes might, like a black fellow, get up one ravine and down another.

"It requires one to be very cautious in travelling through a country of this description, to avoid being surprised by natives or having one's retreat cut off: one great advantage, however, [exists] in the abundance of permanent water everywhere, but food is often scarce. Since leaving the dépôt camp on the Gilliot we have explored about 500 miles of new country, mostly along the northern face of the coast mountains. We passed over what, I have no doubt, will prove to be a rich gold field before long. We did not find any gold; but from the character of the country I have not the least doubt of its existence: should the search in this neighbourhood be unsuccessful we shall cross the coast range immediately, and continue the search on the southern or inland waters about south-west towards Swan River.

"DUNCAN M'INTYRE."

The letter is written in ink, the signature in pencil. It was evidently left uncompleted. The words in brackets have been added by Dr. Mueller.

"*The Hon. Secretaries, Ladies' Leichhardt Search Committee, Melbourne, Victoria.*

"Leichhardt Expedition, Camp, River Gilliot,
7th June, 1866.

"LADIES,

"It is with feelings of the deepest sorrow that I beg to communicate to you the melancholy intelligence of the death of our leader, Mr. Duncan M'Intyre, which occurred on the morning of the 4th inst., at his brother's camp on the River Gilliot.

"I will endeavour, as clearly as I can, to narrate the circumstances immediately preceding and attending his death, feeling convinced that they will be of the most painful interest.

"Mr. M'Intyre, accompanied by Archibald M'Leod and two black boys, left this camp on the 3rd April, and proceeded in a direction slightly to the northward of west to the River Leichhardt. As he has since informed me, after perfectly convincing himself that Leichhardt could not by any possible chance

have taken his party over the country he saw there, he travelled generally in a north direction, following the river down to $18^{\circ} 56'$ s. lat. Here he left the Leichhardt and struck across for the Gregory on his way to the township on the Albert River, where he purposed buying horses and rations. He arrived at Mr. J. G. M'Donald's station on the Gregory on the 18th April. The next day, while following the river down, M'Leod, who was leading the horse which carried the rations, unluckily missed Mr. M'Intyre's track, and he and the black boys were in consequence without food of any sort excepting one ignana until they arrived at the Landsborough River Company's station on Bean's Brook on the evening of the 20th. Near this station he camped till the 4th May, making such visits to the Albert River township, distant 16 miles, as business required. At this time a disease generally known there as "the fever" was raging in the township, and M'Leod and M'Loughlin, who entered the service of the expedition there, as well as the two black boys (one of whom has since died from its effects), were attacked by it. Mr. M'Intyre apparently escaped; but he afterwards, on the 13th May, told me that on one occasion he had feared he had caught it, but was determined to, and did, shake it off. On the 20th May we (I had in the mean time joined the party) arrived at the River Dugald, where Mr. M'Intyre resolved to leave us while he and one black boy proceeded to the Gilliot, distant 50 miles east from the former river, to bring the other portion of the expedition to us. Up to this time he had been by far the strongest man amongst us. Next morning he felt unwell, and attributed it to his having lain in the smoke which arose from a hollow damp log on the fire during the night. Next day he was still unwell; but on Wednesday, 23rd May, he started for the Gilliot, intending to be back in about a week. I did not again see him alive.

"The dromedaries, &c., arrived at the camp on the Dugald on the 29th May; and by that opportunity Mr. M'Intyre forwarded me a note of instructions, informing me therein that owing to extreme weakness he had been unable to reach the Gilliot on the same day he left us, but that he arrived there the next morning in a very exhausted state. He also said then (26th May) that he felt better, and hoped to rejoin us in a few days.

Late in the evening of the 2nd June, I received a note from Mr. Donald M'Intyre, stating that his brother was very ill: and as he would not, in all probability, be able to start with the expedition for some weeks, I was instructed to return with the entire party to the Gilliot.

"The 3rd June was occupied in mustering the horses and preparing for a start out, which we made the next morning.

"On the 5th June, when about 26 miles from the Gilliot, I was met by a messenger bearing the sad tidings that our leader was no more. I of course, immediately pushed forward, arrived at the camp in the evening, and learnt that during the last two days of his life he had been speechless and without the slightest power of motion. Occasionally he suffered very severe pain, while at other times he was in comparative ease. At six o'clock on the morning of the 4th he gently breathed his last. He had expressed a wish, some days previous to his death, that I should read the funeral service over his remains; and I need hardly assure you his desire was religiously respected. We buried him on the morning of the 6th June.

"How severe was his disappointment at not being permitted to finish the great task he had undertaken few can imagine. Rumours which, although utterly groundless, had been widely spread, to the effect that he had accepted the post of leader of this expedition simply with a view to benefit himself and not to achieve its grand object, had reached his ears and had grieved him exceedingly. He had every confidence, however, that he would thoroughly succeed in the performance of his duty, and thus practically refute so base a scandal. On several occasions he mentioned this subject to me, and once added, 'It's no use

telling them they're wrong; I'll show them.' But this he has not been allowed to do. In his last letter of instructions to myself, which he had dictated to his brother, he said, 'all those who have travelled with me will be able to give evidence if I adhered to the terms of the agreement to really search for Leichhardt while a horse or a camel remained of the expedition.' That he did so, and would have continued to do so, none who knew him can doubt.

“ W. F. SLOMAN, Second in Command.”

7. *On the result of Mr. McKinlay's Exploration in search of Lands suitable for Settlement in the neighbourhood of Adam Bay, in Northern Australia.* Extract of a Despatch from Sir D. DALY, Governor of South Australia, to Lord CARNARVON, dated 27th September, 1866.

(Communicated by the COLONIAL OFFICE.)

“THE arrival yesterday of the schooner *Beatrice* from Adam Bay, with Master Howard, R.N., and the survey party, has furnished me with dates from that quarter to the 14th August.

“Mr. McKinlay, with two of his exploring party, have also returned in the *Beatrice*.

“No deaths had occurred in the settlement, and all were in good health; but I regret to say that with the mention of these fortunate circumstances ends everything favourable that can be reported of the prospects of the Adam Bay Settlement, which I fear must be considered a complete failure.

“Time does not permit my giving your Lordship full details of the causes of McKinlay's want of success, in the discovery of lands more suitable for settlement than Escape Cliffs. After having lived upon horse-flesh as long as that source of supply lasted, he constructed a kind of boat, partly with the horses' skins, in which he and his party managed with great difficulty to return by the coast to Adam Bay.

“Mr. Howard's Report, of which I have the honour to enclose printed copies,* shall be accompanied by any further particulars that can be supplied by this mail; but full details shall be transmitted by the next, by which time I shall likewise probably be able to inform your Lordship of the final intentions of my Government in regard to this first unfortunate effort by the colony to settle the Far North.

“At present the intention is to despatch a vessel immediately to bring back the remainder of the party with all their effects, and for the time, at least, to abandon all further efforts at settlement in that quarter.”

* Mr. Howard's Report will be printed in the Journal of the R.G.S.

PROCEEDINGS
OF
THE ROYAL GEOGRAPHICAL SOCIETY.

[ISSUED APRIL 10TH, 1867.]

SESSION 1866-7.

Fourth Meeting, January 14th, 1867.

SIR RODERICK I. MURCHISON, BART., K.C.B., PRESIDENT, in
the Chair.

PRESENTATION.—*Capt. J. B. Caldbeck.*

ELECTIONS.—*Thomas Black, Esq.; Robert Brown, Esq.; Capt. George Ernest Bulger, F.L.S., &c.; Michael G. Graham, Esq., M.D.; O'Dell Travers Hill, Esq.; William B. Lambert, Esq., C.E.; David Maccloughlin, Esq., M.D., ETC.; Lawrence Oliphant, Esq. (of Coudie, Perthshire); William Henry Potter, Esq.*

ACCESSIONS TO THE LIBRARY SINCE THE LAST MEETING. *Donations.*—Maillet's 'Description of Egypt.' Hague, 1740. 'Climat de St. Reno,' Dr. Daubeny. 'Lettres sur la Morée et les Isles de Cerigo,' par Castellan. 'Reisebeschreibungen für die Jugend,' by J. H. Campe. 'Nurnberg,' von Dr. F. Maher; 'Nurnberg,' von J. F. Roth (Guide-books). 'Prag,' von Dr. L. Alucklessig. Lindau's 'Sacher-schen Schweiz.' Körber's 'Fremdenführer in Frankische Schweiz.' Julin's 'Semmering und Reichenau Führer.' Müller's 'Aachen und Umgebungen.' Cutler's 'Spa and its Mineral Springs.' Geuth's 'Iron Waters of Schwalbach in Nassau.' Hoser's von 'Franzens-brun bey Eger.' Eger & Elster, 'Marienbad, Carlsbad,' etc. Herrlein's 'Aschaffenburg.' Polak's 'Ischal Guide.' Tylor's 'His-torical Tour in Franconia.' 'Guide to the Grand Chartreuse.' 'Guide to Chartreuse de Pavia.' Miss Pardoe's 'Chartreuse.' 'Guide al Sacro Monte di Varallo.' All presented by S. M. Drach, Esq., F.R.G.S. 'Ricordi di un Viaggio in Oriente.' Rome, 1866. 'Diffu-sione Geographia.' Rome, 1862. 'Di Clima di Gondogoro.'

Rome, 1861. 'Sulla Scoperta delle Origini del Nilo.' 1864. All presented by the author, M. Nardi. 'On the use of Petroleum for Locomotives.' 'Ueber das Zeitalter des Geographen Eudoxus des Astronomen Gemios.' 'Ueber die antiken Namen und die Geographie der Baumwolle im Alterthum.' 'Report on the visits of Lieut.-Colonel Merewether, c.b., to places between Aden and Suez.' Wilson's 3rd volume of 'Imperial Gazetteer of England and Wales.' Portfolio from Cassel, 'Theoretisch-Practische Schule des Situationszeichnens.' A manuscript, 'Appertenant à l'Ouvrage de Cialdi, sur les Movements de la Mer et ses Effets,' pages 535-57. Cialdi, 'Sul Moto Ondoso del Mare.' Cialdi, 'Ports Canaux.' Baer, St. Petersburg, 'Der Haut Gefunden Mammuths, und die zur Vergung desselben ausgerüstete Expedition.' A manuscript, 'Australia formerly a Satellite to the Earth; a Philosophical Treatise on the Earth and its Satellites,' by W. Watson, Sydney, Australia. 'Cathay, and the way thither.' Hakluyt Society. Bailliver's 'New South Wales Gazetteer and Road Guide.' By the Government of New South Wales. 'Descriptive Notes on Peking; with a large Map compiled from native authorities. By Henry Kopsch and Edg. Tainor. 'Physical Geography,' by Ansted. 1867. 'The Elements; an Investigation of the Forces determining the Position of the Ocean.' By Jordan (W. L.). Loffter's 'Forsog paa en Geonostic,' etc. Malte-Brun's 'Resumé Historique et Geographique de l'Exploration de Gerhard Rohlfs, au Zouât et à In-Calah.' 'The Alps of Hannibal,' by Wm. J. Law, M.A., F.R.G.S. Presented by the Author.

Purchased.—'Amerigo Vespucci, son Caractère,' etc. 'La Florida del' Inca,' by de la Vega. 'Chronologico para la Historia de Florida.' 'Principles of Geology,' by Sir C. Lyell. 'Die Insel Cypren.' 'Der Niger der Alten.' 'Die Preussische Expedition nach Ost-Asien.'

ACCESSIONS TO THE MAP-ROOM SINCE THE LAST MEETING.—Maps of the Ordnance Survey of Great Britain, 346 in number. Presented by the Ordnance Survey Office, Southampton, through Sir H. James, R.E., Director. Map of Central Asia, by Lieutenant-Colonel J. T. Walker, from British and Russian authorities. Presented by C. R. Markham, Esq., Secretary. Map of the Island of Java, showing the political divisions and volcanoes, by Dr. A. Petermann. Map of the River San Francisco (Brazil), by Eml. Liais, Esq. Presented by Dr. A. Petermann. A Map of London, showing the Metropolitan Railways and Miscellaneous Improvements to 1867. By E. Stanford, Esq. Presented by the author. Map of Equatorial Africa, illustrating M. du Chaillu's Routes in 1864-5. Presented by M. du Chaillu. River Volta and country adjacent, by Chr. Hornberger,

&c. Presented by Dr. A. Petermann, 1867. Map of the Marquesas Islands, Pacific Ocean. Presented by Dr. A. Petermann. Map of the Sulden-Gebietes, near Ortler, the Rhaetian Alps. Presented by Dr. A. Petermann.

The following Papers were read:—

1. *Notes of a Journey from Bida, in Nupe, to Kano, in Hausa, performed in 1862 by Dr. W. B. BAIKIE, R.N. Extracted from portions of Dr. Baikie's Journals in possession of the Foreign Office.* By J. KIRK, Esq., M.D., F.R.G.S.

(Communicated by the FOREIGN OFFICE.)

DR. BAIKIE left Lukoja, the British settlement formed by him opposite the confluence of the Binuwe and the Niger, in December, 1861, on a journey to Hausa, to recover the papers of Dr. Vogel and other travellers. He remained at Bida, the capital of Nupe, until the month of April following, and then set out on his march in a north-easterly direction towards Kano. On his journey he passed through several towns of considerable population, the inhabitants of which spoke the Hausa language. On the fifteenth day of the march (April 28th) his party entered the country of Zariya, and on the 30th reached the capital of that district, which is one of the great centres of commerce of Hausa. The silk-cotton trees which surround the town make its site conspicuous in the midst of the plain; there are upwards of 1000 of these trees, varying from 50 to 70 feet in height. The height of the plain above the sea is 2000 feet, and rivers drain it to the Kaduna and thence to the Kwora. On the 26th May Dr. Baikie left Zariya, diverging from his route to visit the King at his war-camp, and resuming his north-easterly course on the 18th of June. On the 29th, having left the town of Antsan, they found the streams flowing in an opposite direction, to pass round Bebeji and join one of the affluents of Lake Tshad: after crossing several of these streams the party reached Kano on the 2nd July. He was well received by the King, who was at his war-camp in the south-easterly part of his dominions, and all the papers of the European travellers were ordered to be delivered up to him; but it now appeared that the greater part were at Zinder, whither they had been taken by the Azhenawa after the murder of Corporal Maguire. The paper concluded with tables of routes and barometric observations, and lists of the Kings of Zariya and Kano. It will be printed *in extenso* in the 'Journal,' vol. xxxvii.

The PRESIDENT said the thanks of the Society were due to the Foreign Office for communicating this abstract of the adventurous journeys of the late Dr. Baikie, undertaken in the course of his mission to Africa. He would also ask the meeting to return their thanks to Dr. Kirk, the companion of Livingstone, for having prepared this excellent abstract, from the voluminous docu-

ments which Dr. Baikie had left behind him. He (the President) had a strong personal interest in the labours of Dr. Baikie, because he was President of the Society at the time the expedition to the Niger was decided upon. He wrote to his lamented friend, Sir John Richardson, the eminent naturalist, then the head of the Medical Department of the Naval Establishment near Portsmouth, and Dr. Baikie, who was a young assistant-surgeon under him, at once volunteered for this special and most dangerous service. Dr. Baikie was wrecked in the steamer the *Day Spring* in ascending the Niger in 1857, and showed his fertility of resource in establishing his party in camp on the shore, saving what they could from the vessel, and cultivating relations with the neighbouring chiefs, especially with the Sultan of Sakatu; thus supporting the party in this position until another steamer arrived from England. Dr. Baikie passed seven years in that region, and, under the auspices of Her Majesty's Government, established at Lukoja a station, with the object of opening up commercial relations with the intelligent chiefs of the neighbouring country, and he had advanced a considerable way in producing the best feeling and harmony between the native tribes and the British establishment. Now, when he told them that he had the authority of Commodore Wilmot, the late Commander of our naval forces upon that coast, for stating that this station had attained a degree of usefulness that was highly creditable to the British nation, they would willingly offer their tribute of admiration to the devotion of Dr. Baikie. After passing through all the trials incident to a long residence in that country, he was, on his return home, at Sierra Leone, suddenly seized with fever and carried off. He, the President, had most willingly signed a petition now before the Lords of the Treasury in favour of the relatives of Dr. Baikie, who, he was sorry to state, were left in bad circumstances.

Mr. TRELAWNEY SAUNDERS said he should be sorry if the paper of his lamented friend, Dr. Baikie, passed without remark. There must be many who had a kindly recollection of him, a most genial man, learned and well-informed; and he had added very considerably to our knowledge of Africa. It was through his voyage on the Chadda that he first became known as a geographer. It was then almost a new river to us, and it was through his labours that we became so well acquainted with its course. It appeared by the present paper that he had visited another new river, the Kaduna. This journey was through a country lying between the course Clapperton took on the north, and that which Lander took in his attempt to reach the Niger after Clapperton's death; so that it was a welcome addition to our geographical knowledge. This great interior country was an elevated region, possessing large towns, forests, and a climate suitable to Europeans. The death of Dr. Baikie was the more to be deplored from the circumstance that he appeared to have left no one to succeed him as the apostle of African exploration in the Soudan. If Africa is ever to be civilised, it is to the Soudan that we must look as the chief seat of any movement for that purpose. It was the seat of a great commerce and of a great population. It contained also the largest Mohamedan empires in Negroland, the Fellatah territories extending from the coast nearly half across the continent, thus affording some proof of the capability of the Negro for organisation. He should be proud to see the day when some combination, like the East India Company, would take a strong hold of Africa, and deal with the natives as we had done in India.

2. *A Visit to Vohimarina, the North-East Province of Madagascar.* By the BISHOP of MAURITIUS.

THIS province, called Vohimare by Europeans, is on the whole mountainous, but it possesses, along the courses of its rivers, large

and fertile valleys, which present every advantage for colonization : they might be made to grow all kinds of tropical produce, and the woods, especially those around the Bay of Diego Suarez, abound with excellent timber. It is only the neighbourhood of the Bays of Vohimare and Diego Suarez that the country is inhabited, the interior being peopled only by wild oxen and a few scattered hunters who are employed in their chase. The indigenous population is composed of Sacalavas and Betsimsarakas ; the dominant Hovas have a few ill-built forts at some distance from the sea-shores. The houses of the Betsimsarakas are very clean and neat, much more so than those of the Hovas or Sacalavas. This the author thought might be attributed to their intercourse with Europeans. The beautifully fair countenances and the partly European features of some of them, and the many foreign tombs at Vohimare and elsewhere, lead to the supposition that many Europeans (some say old pirates) settled on the east coast of Madagascar and married native women. The bullocks of Vohimare, owing to the superior pasture, are the best in Madagascar, and fetch a higher price at Mauritius than any others. The paper gave some detailed information concerning the valleys, rivers, and forests of this part of Madagascar, and also contained extracts from the diary of the author kept during a journey in the province, in September 1865. It will be printed entire in the 'Journal,' vol. xxxvii.

The PRESIDENT in returning thanks to the author, said that those who had read the interesting work of Mr. Ellis the missionary, would recollect that very little was known respecting this fertile tract of north-eastern Madagascar. He thought it was highly to the credit of a bishop of our Church that he should have gone through this region and given us so good a description of it.

Mr. J. CRAWFURD said they were greatly obliged to the Bishop of Mauritius for the account he had given of this little-known part of Madagascar. The people of Madagascar, especially the Hovas, seemed on the whole to be in a better position and in a higher state of civilisation than the people of Africa generally, more particularly on the east coast. They owed this to an accidental and hitherto unexplained intercourse which they formerly had with the Malays, a race inhabiting a region 3000 miles distant. How the Malays got to Madagascar he would not venture to say. But the Malay language was there, as he had before had occasion to observe at meetings of the Society. He had counted at least 150 Malay words, very clearly to be distinguished from the common language of the country, these including the whole of their numerals up to one thousand. The Africans on the continent generally counted up to ten, very rarely up to one hundred ; but here were the complete numerals of the Malay, up to one thousand. The names for many things, such as rice, the yam, &c., were Malayan. Still they were essentially African negroes, a very indocile and unimprovable race. With their many advantages they ought to have made greater progress. They possessed the horse, ox, and the hog, with rice, yams, millet, maize. Supposing the Mabries possessed all these, what a people they would have been ! what a superior genius they displayed as compared with these Africans ! He did not at all agree with the advice of

Mr. Saunders, that we should lay a strong hold of Africa. He did not know what we could lay a strong hold of except sheer barbarism. He knew what would lay a strong hold of us, and that was malaria. These regions were not fit for colonisation by Europeans, because they were almost entirely tropical. The very description which the Bishop gave of the plague of mosquitoes was enough to keep Europeans out of Madagascar. With regard to the civilisation of Africa, it was very clear that almost all the civilisation which the Africans had received had been derived from foreign quarters. It was mortifying to us to think that it was the Arabs and the Mohamedan religion that had improved the Africans. Wherever they happened to be converted to Mohamedanism, they were sure to be more civilised than when they remained mere pagans; better clothed, better fed, and more humanised, giving up those horrible rites which characterised the native religion.

3. *Diary of a Hill-Trip on the borders of Arracan.* By LIEUTENANT
T. H. LEWIN.

THIS paper consisted of extracts from a report, by the author, of a hazardous journey he and his party had recently performed, in the course of their police duty, amongst the wild hill-tribes of the borders of Bengal, Arracan, and Burmah. The diary commences on the 15th November, 1865, and terminates with the arrival of the author at Chittagong on the 11th February, 1866, after a narrow escape from a hostile party of the Shindoo tribe, who forced them to take refuge for two nights in the jungle.

MR. CRAWFURD explained that this paper was a portion of the diary of one of a number of officers called "Superintendents of Police" on the eastern frontiers of Bengal, where the two Eastern types of people, the Hindoo and the Mongolian, meet. Lieutenant Lewin was engaged in this duty, and towards the conclusion of the diary gave an interesting account of his adventurous attempt to penetrate the territory of these wild tribes. Between Burmah Proper and Pegu lies a district peopled by the Arracanese and a number of other tribes, all speaking different languages. In attempting to penetrate into the country, Lieutenant Lewin and Lieutenant Monro and their party were surrounded and pursued, and they saved their lives with the utmost difficulty and with the loss of all their property.

The PRESIDENT, in expressing the thanks of the Society for this communication, said Lieutenant Lewin had displayed in this journey that gallantry common to British explorers, of which they were much accustomed to hear in the rooms of the Geographical Society.

Before the conclusion of the meeting the President announced that the Council had that day voted a further grant of 50*l.* towards the expenses of Mr. Gerhard Rohlfs' journey in Central Northern Africa. This adventurous young German, a native of Bremen, had succeeded in penetrating alone, from Tripoli to Kuka, on the shores of Lake Tshad, whence he had written to the Society announcing his intention of proceeding at once to Wadai, where Dr. Vogel was murdered, and he hoped to recover the papers of that traveller.

Fifth Meeting, 28th January, 1867.

SIR RODERICK I. MURCHISON, BART., K.C.B., PRESIDENT, in the Chair.

ELECTIONS.—*Viscount Adare; Richard Baxter, Esq.; Frederick N. Gisborne, Esq.; Carleton L'Estrange, Esq.; Alexander F. Low, Esq.; Charles Lanyon Owen, Esq. (Lieut. Royal Marines); Colonel C. W. Tremenhoe, R.E.*

ACCESSIONS TO THE LIBRARY SINCE THE LAST MEETING. *Donations.*—*'A Voyage to the Isle of Elba.'* By A. Thiébaud de Bernard. 1814. *'Remarks on some Parts of Italy.'* By Joseph Addison. 1701-1703. *'The Argonauticus of Apolonius Rhodius.'* By Francis Fawkes. 4 books. 1780. *'Travels of an Arab Merchant in Soudan, Darfur, Wadai.'* Translated by Bayle St. John. *'Diary in the Dardanelles, from Tenedos to Marmora.'* By Wm. Knight. 1849. All by S. M. Drach, Esq., F.R.G.S. *'Correspondence of Lieut.-Colonel L. Pelly, Political Resident, Persian Gulf, with Government of Bombay.'* Map-routes of caravan, &c. 1864. By the Secretary of State for India, *'Neueste Nachrichten aus den Innern Afrika's von G. Rohlfs.'* By Dr. Petermann. Lieutenant Ross, *'Visit to Kej, through Mekran, from Gwadur to Kurrachee.'* Also *'Notes on Mekran.'* By the Governor of Bombay. The Classified Index of the Athenæum Library Catalogue. 1867. By the Committee of the Athenæum Club. *'The Elements.'* Vol. 2. By Wm. S. Jordan. 1867. By the Author. *Statistics of New Zealand.* 1866. *'Relação da Exploração do Rio Purús'* by Joao Martins da Silva Coutinho. 1862. By Rev. J. C. Fletcher. *'L'Origine des Berbers-Thamon, à propos des Lettres sur la Sahara.'* By Henri Aucapitaine. By the Author. *Liber del Saber 'De Astronomia.'* Del Rey D. Alphonso de Castille. *'Die Bedeutung moderner Grand-Messungen.'* By Dr. Carl M. Bauerngeind. *'Kunde des Morgenlandes.'* Prof. Dr. Hermann Brockhaus. By the Author. *'Alcalá de Henares.'* Description por D. Antonio M. Lopez y Ramajo. 1861. *Purchased.*—*'The Story of the University Mission to Central Africa.'* Rev. Henry Rowley.

ACCESSIONS TO THE MAP-ROOM SINCE THE LAST MEETING.—Map to illustrate the Route of M. du Chaillu in Central Africa. Presented by the Author. 2 Maps of Asia Minor, Geographical and Geological. By P. de Tchihatchef. Presented by Sir R. I. Murchison, President. Map of Russia and Sweden, No. 36 of Stieler's Hand Atlas. Presented by A. Petermann. Map of Cooper's Creek and the adjoining Stony Desert, from the journeys of Sturt, Wills, McKinlay, and

Howitt, from 1845 to 1862. Presented by A. Petermann. Admiralty Charts, 12 in number. Ordnance Maps, 223 sheets, and 21 Area Books.

The following Papers were read :—

1. *On the Geography and Climate of India, in reference to the best Site for a Capital.* By the Hon. GEORGE CAMPBELL, of the Indian Civil Service.

(Extracts.)

If it be conceded that a new capital is wanted, and if there be a pretty general agreement on the most essential requisites for a European capital in India, it only remains to go forth, map in hand, and try to find a suitable place. I have for many years had occasion to turn my attention to the collection of facts regarding the present condition of India, and have continued that practice till it has become a habit of my life. I have made the round of all the British Provinces. It has been my fortune to be employed in widely different parts of India, and thus to have acquired a personal familiarity with at least four of the great Administrative divisions.

The following are the points especially to be kept in view in selecting the site for the capital :—

1. It should be as far as possible central, geographically and politically, and easily accessible from the different parts of India.

2. It should be within easy reach of the sea, but not so near as to be exposed to danger of attack from the sea; *cæteris paribus*, that coast would be preferable from which there is the most direct and rapid communication with Europe.

3. The climate should be temperate, and, with such aid as local surroundings may afford, tolerable throughout the seven or eight warm months of the year. At the same time it should not be too cold, damp, or rainy, nor unfitted for native constitutions at that season.

4. The site should be sufficiently roomy, should afford space for some European settlement, and should possess such amenities in itself and in the neighbourhood as might be expected to attract settlers, schools, &c.

5. It should be within reach of the influences of the public opinion of a great European and civilised native community, engaged in practical business.

Among the requisites are some which must be considered, to a great degree, obligatory, and without a tolerable mark in which no candidate can be passed. These are, I think, climate and nearness to the sea, and perhaps also the immediate proximity of a great

public opinion. If I am right as regards these obligatory conditions, our inquiry might be narrowed much. It might probably be assumed that no place within fifty miles of the sea will answer the purpose. We should then but have to take a strip round the Peninsula, ranging from 50 to 150 or 200 miles from the sea, and to see if we can find a good climate in that space. If, again, it be admitted that it is necessary to be in easy communication with and within the immediate influence of one of the present great centres of Indian business and civilisation, the question is much farther narrowed, and becomes simply this, Is there within a few hours' journey of Calcutta or of Bombay a place suited by climate and position for the new capital? We know that there is no such place near Calcutta. Therefore we come to the still more narrow question, Is there such a place within reach of Bombay, within a couple of hundred miles of Bombay, on one of the main lines of railway diverging from that place? In short, is there any suitable site in the high country which exists immediately above Bombay?

But I propose to take a wider survey of the whole country, and fairly to compare the advantages and disadvantages of different places in their various aspects.

I can answer for myself that though I have taken a good deal of trouble in the way of inquiry, I never fully realised the character of the countries which I had not seen till I did see them. Even as regards ordinary geography, I once imagined that a low plain extended to the south of the Neilgherries, through which the Madras Railway ran to the opposite coast, and was astonished to find myself running through a picturesque hilly country, 1500 feet above the sea, on a line abounding in steep gradients and sharp curves. I believed, too, I confess, that the Concan was a flat country between the ghats and the sea, a sort of Indian pontine marshes, and that the Nagpore territory was "otherwise called the valley of Berar." On the other hand, I never knew an intelligent Madras or Bombay man who did not imagine Rohilkund to be a delightfully hilly country. My impression, then, on the whole subject is, that though the amount of knowledge regarding every part of India is vast, it wants putting together; and my attempt is merely in a rough way to put together the most salient points of our knowledge, so far as regards my present subject.

It is probably unnecessary to say that India is on the land side shut out and walled off from the rest of the world by the system of great mountains which extend in a curve approaching to a semi-circle from Kurrachee to Chittagong, in which any altitude may be attained from the side of India, and which are for the most part

inaccessible from the other side. Of the highest and most secure portion of this mountain system, the great Himalayan range, a considerable extent is British territory, stretching in several places right up to the eternal snows and to the borders of the Thibetan plateau of high Asia. The outer range of the outer Himalaya very commonly attains a height of 7000 or 8000 feet, and a sea of mountains extends back for 100 or 150 miles to the inaccessible snows. The general characteristic of the range may be said to be that as a rule it contains no valleys, no lakes, and no table-lands. There is but, as it were, a gigantic system of ravines; the valleys are ravines, and the mountains are very steeply-inclined sharp-backed ridges.

On the hills throughout the entire range it may be said that there is not one acre of level ground. The sparse dwellings and fields of the hill-men are terraced on the mountain sides, or obtained by taking advantage of petty nooks and shoulders of hills, indistinct alluvial steps on the sides of ravines, and small strips of rice-land at the bottom. Except on the rare roads, curiously constructed with great engineering skill, wheel and even most animal carriage is out of the question; and even on foot none but a hill coolie, an inveterate sportsman, or a mountain sheep, can attempt to leave the roads.

Within this system of mountains lies the great alluvial, or diluvial, plain which also extends in one continuous curve from the mouths of the Ganges to the mouths of the Indus, with a breadth of about 150 to 200 miles, forming, in the different portions of its length Bengal proper, the North-West Provinces, and Oude, the Punjab territories, Scinde, with the adjacent desert, and, perhaps we may add, Guzerat. Here the contrast to the hills is carried to the utmost; for as in the hills there is not a piece of flat ground sufficient to plant the sole of one's foot, so in the plain there is nowhere, it may be said, an undulation of twenty feet, and no such thing as a stone of the smallest dimensions throughout its whole extent. For our purpose the plain may be considered as nowhere rising perceptibly or materially above the level of the sea.

The whole of the rest of India may be said to be composed of one solid formation of a pretty uniform character, to which the deltas of the rivers and low diluvial lands of limited extent are mere exceptions. By far the greater portion of all this tract is a rocky and more or less hilly formation, considerably elevated above the level of the sea, and it is contrasted equally with the Himalayas and the plains; for as the one is all sharp-peaked ridges without valleys, and the other all dead-level plain, here it may be said that there is nowhere either one or the other; all the hills seem to have flat tops, and all the rest is undulating high land and valley. Hills are

nowhere altogether absent, and the country is seldom purely mountainous. This formation ends to the north and south in two apexes conspicuous on the map, the city of Delhi and Cape Comorin, which, singularly enough, are as exactly in the same longitude as if they had been laid out with a plumber's line. If we include Cutch and Kuttaywar, we may describe the whole as a diamond-shaped country, the points of which are Delhi, Cape Comorin, Cutch, and Rajmehal. The geological character of the whole of this region is, I believe, in its principal features much the same throughout, and very peculiar, large masses of trap being constantly thrown up over the sandstone and other formations into hills and eminences, which again are usually capped by the singular flat tops composed of red laterite. The soils (with the exception, of course, of the alluvial and diluvial deposits interspersed) seem to be pretty universally composed of two sorts; the peculiar black soil, said to be the *débris* of the trap, often of considerable depth, and lying upon a retentive kind of rubble, and the red soil the *débris* of the Laterite. Both are fertile, though as different in their characters as heavy and light soils can be.

Delhi, as is well known, is situated within a few feet of the level of the plain, on the last low spur of the red sandstone projecting towards the north, so that not only historically but geographically it is a permanent point. It is, as it were, the last point where a city is not liable to be washed off the alluvial soil by a change in the course of the great rivers. Agra is also on the edge of the solid formation. For a considerable distance south of Delhi the country does not seem to rise to any considerable height, and when it does rise it is very gradually to the south and west. Farther east, opposite Allahabad and Mirzapore, there is a more marked and sudden rise by a steep ghat line, and as we go south and west we come to a considerable elevation and a pleasant climate. Neemuch is about 1400 feet high, and farther on many stations, situated widely apart, are all placed at a pretty uniform height of about 2000 feet above the sea, viz., Saugor, Indore and Mhow, Oodeypore, Baitool, Chandwara, Seonee, Hazareebagh, and others. In the extreme west the Aravallee range culminates in Mount Aboo, upwards of 5000 feet above the sea. Along the southern face of this high land a considerable height is also attained in several places.

It appears to me that the common assumption that the Nerbudda is the boundary between North and South India is a mistake. Rivers never are ethnological and seldom geographical boundaries. The Vyndya range, north of the Nerbudda, in the sense of a marked dividing line (a sort of backbone of India as it is sometimes supposed to be) seems to be quite a myth. I mean, that it is not an

elevated range of hills forming a real and substantial boundary. The country to the north having already attained a general height of about 2000 feet, I believe that scarcely a peak of this range rises 500 feet above the general level; at any rate, it is certain that throughout the whole range there is not a spot which has ever been used or suggested as a sanitarium on the smallest scale. On the upper valley of the Nerbudda there is not even a heavy descent; the roads seem to find their way into the valley without any very steep or marked ghats. It is only lower down, when the Nerbudda has cut a deeper and narrower gorge into which it rushes down over rocks and falls, that its level is low, jungly, and unhealthy. It may be said that south of the Himalayas and north of the Nerbudda there is no available ground whatever above the general level of 2000 feet, excepting Mount Aboo.

What is called the valley of the Nerbudda seems to be in fact but a narrow and partial depression in the general level of the high land, into which the Nerbudda runs at Jubbulpore, and out of which a branch of the Soane runs the other way, a little to the east of Jubbulpore. Easily the roads from north to south make a slight descent to Jubbulpore and Nursingpore, and easily they rise again to their former level in the country south of those places. That country as a plateau reaches its greatest height of 2200 or 2300 feet quite on its southern edge, immediately before we come to the steep ghats on its southern face which lead down to Nagpore and Berar; and on this southern face of the plateau the hills do rise considerably above the general level, constituting what I shall in general terms call the Sautpoora range. That range seems to me to be the only real backbone running east and west. In the sense in which I use the term, it extends from near Broach by Asseerghur, Baitool, Pachmaree, Seonee, Ummerkantak, Sohagpore, Hazareebaugh, and Parisnath, to Rajmehar, and divides the watersheds of the Nerbudda and Ganges from those of the Taptee, Godavery, Mahanuddee, and Damooda. The Pachmaree hills in the Central Provinces are about 4500 feet. Near Ummerkantak there is similarly high land, and Parisnath is 4478 feet high. The southern face of this range seems to be in every way the true natural and ethnological boundary of North India. Till we come to these ghats the population (with the exception of the scattered Gonds and Khonds of the hills) are Hindee speaking, and in all their characteristics Hindoostanees.

Immediately under the southern face of the Sautpoora there is generally a strip of jungly, unhealthy, and almost uninhabited country, which still more tends to make the natural boundary distinct. As soon as we get south of this line we are among the Mahratta-speaking population of Kandeish, Berar, and Nagpore, the

Ooryahs of the Mahanuddee, and the Telingas of the Lower Godavery, in short, in Southern India. I designate as the northern plateau the country rising to the south and west from Delhi, Agra, Allahabad, and Sasseram, into Central India, and bounded on the west by Aboo and the Aravallees, on the south by the great length of the Sautpoora range from Tooran Mull to Parisnath.

This northern plateau is separated from what I shall call the southern plateau by a depression much deeper and more considerable than that of the Nerbudda, and forming a much more distinct geographical division. It may be said to extend right across India from the gorge of the Lower Taptee, by Kandeish, Berar, the valleys of the Nagpore Province, and the course of the Wardah and Godavery to the Bay of Bengal. This country does not descend quite to the level of the sea, nor is it so flat an alluvial plain as the great plains of the Ganges. But it is all situated at a level so low as to make its character entirely tropical. The whole of the country between the Godavery and the Mahanuddee, and again from the Mahanuddee to the borders of Bengal, is (with the exception of the strip along the coast) unhealthy, jungly, and sparsely inhabited in the extreme. This is, in fact, the great tract so long marked as "unexplored," and to the present day almost a blank in our maps. This unexplored country seems to be very hilly and broken, and it lies, at the same time, for the most part comparatively low, and within the worst fever-level. But on the south-eastern border, approaching the sea, as if to make up for previous deficiencies in elevation, the eastern ghats rise far beyond their height in any other portion of their course. As, however, the healthiness and practicability of these places has not been ascertained, and I do not think it probable that under any circumstances any one will propose to place the capital of India there, it will probably not be necessary that I should recur to them.

We may say that the depression dividing the northern plateau from the high country to the south attains its greatest breadth of about 60 miles in Berar, and is there a very well-defined valley, distinctly bounded by the Sautpooras on one side, and by the southern ghat range on the other side. The proper western ghats (as the name is usually applied) seem to end at the Taptee, for beyond that river, though a broken hilly country is continued to Aboo and the Arravallees, it is not so clearly marked as a defined range running north and south. From thence the north extremity of the proper western ghats just south of the Taptee, as if the ghat had taken a turn at right angles, the range which I have already in general terms described runs east and west. It is comparatively low, and at first not very prominently marked, sloping gradually into Kandeish, but

further east it is very well marked, and contains, as I have said, some pleasant climates about Ajunta, Booldana, &c. It is, however, more important for my purpose, as marking the northern limit of the southern high land. The line of this range, and its continuation of hilly country along the right bank of the Godavery to the eastern ghats, may be said to mark off from the rest of India the Deccan, or south country. This south country, again, is principally occupied by the high land to which the term Deccan is in its more general sense applied.

The Deccan may be described as a triangle bounded by the northern line already mentioned, the western, and the eastern ghats. But the country about the Lower Kistna and Godavery seems hardly to partake of this character, and there does not appear to be any high ground which requires mention in that portion of the eastern ghats; therefore we may limit the eastern boundary of the southern plateau to about the longitude of Hyderabad. It extends, then, for our purpose from Berar to the Neilgherries, and from the parallel of Hyderabad to the western ghats. It may be said to have a general level of about 2000 feet, the plateau generally ranging from 1500 to about 2500 feet, and most of the stations in the Deccan being either a little above or a little under 2000. Belgaum, Dharwar, and Mysore are about 2500, while Bangalore alone attains 3000. The plateau generally slopes gradually from west to east. All the rivers rise in the western ghats, and find their way through the eastern ghats to the Bay of Bengal.

The western ghats all along the line rise in ridges to a considerable height above the level of the plateau; but there are everywhere passes through them, little, if at all, above the ordinary plateau levels. In fact, the ghats are not, as generally depicted, a ridge running north and south. The rise of level, the break, as it were, and upheaval in the crust of the earth, runs north and south, but the hills are rather a succession of transverse ridges, placed, as it were, edgeways to this line of general elevation. The sudden break in these ridges, and subsequent denudation by watercourses and landslips, gives to the broken ends a peaked and jagged appearance when we look from below. But on the other side, where the ridges run back into the Deccan, the usual flat-topped character of the hills is observed, and along, as it were, the flat backs of the ridges, ground is found fitted both for cultivation and for sanitarium, not broad, but running back in narrow irregular slips and promontories. On such places, at elevations of from 3500 to 4500 feet, say generally about 4000 feet, are and may be placed sanitarium, in a cool climate, at many points all along the ghats. The transverse ridges themselves gradually tail off into the Deccan, but some of the most

prominent may be traced for almost hundreds of miles, *e. g.* one runs from immediately over Bombay (from about Jooneir) to Beder, not far from Hyderabad. On one of the flattest tops of one of these transverse ridges, immediately overlooking the drop into the lower country, and therefore, at one of the highest and coolest points, is Mahableshwar. All over the Deccan occasional flat-topped hills stand up here and there, and are sometimes so large and so high as to afford room for sanatoria. There is a good one near Bellary 3500 feet high, two near Bangalore marked 4600 feet, one in the north of the Mysore country marked as upwards of 6000 feet high. Between the ghat ridges the narrow passes through which the roads are carried soon expand into the large valleys and broad irregular high-level plains of which the Deccan is mainly composed.

At the southern extremity of the southern plateau the western and eastern ghats seem to run together, and to be heaved up into the great block called the Neilgherries, which, again, has a flattish top about 7000 feet high. South of the Neilgherries there is a great depression, which does not altogether sink to the level or character of a plain, the railway through this depression running through a country for the most part hilly, and in places as high as nearly 1500 feet. Beyond this depression, again, rises another block or range almost as high as the Neilgherries, and similar in character, which, at a greater or less elevation, extends to Cape Comorin, and the different parts and branches of which are known as the Pulneys and Anamulles, Travancore and Tinnevely hills: they are all parts of one connected range.

Thus, then, I have, I think, exhausted in general terms the map of India, with especial reference to the altitudes by which the climate is so much determined. Setting aside those parts which I have dismissed as immaterial to our present purpose, I may say, then, that we have the following regions:—

1. The Himalayas.
2. The Great Plain.
3. The Sea Coast.
4. The Northern Plateau.
5. The Southern Plateau, or Deccan.

The south-west monsoon may be said to blow partially from that quarter at an earlier date (especially in the south), but it only acquires strength, and begins to bring in the regular rains about the beginning of June. It is chiefly felt as a regular monsoon (that is, a strong and constant wind from one direction) on the west coast, and in the countries which derive their supply from that quarter. There it comes in from the west with great violence in June and July; and though the wind becomes lighter in August, the rains

may be said to last to the beginning of October. It appears, so far as I can gather, that they are not quite so heavy in the extreme south, but going northward, along the Malabar and Canarese coasts, they are excessively heavy, and so continue till towards Bombay they begin to lessen in intensity. North of Bombay the quantity of rain lessens; in Guzerat it is much less, and further north it disappears altogether; so that in Scinde and the desert there is no regular rainy season, and scarcely any rain. The great plain, therefore, gets no rain supply from the west, unless, indeed, any of the western clouds find their way to Agra, or other places on the banks of the Jumna, of which we have no information. The mass of the clouds brought up by this west monsoon are poured out on the western ghats, the rainfall there rising as high as 300 inches or more, and rendering all the exposed places on the ghats and neighbouring hills almost uninhabitable in the rainy season. But though these very watery clouds reach to the top of and over the crest of the highest of the ghats, it is singular that they go little beyond the outer line. It appears one of the most extraordinary phenomena to be seen, that on these ridges you may stand at an elevated site and see one point (near the edge) where there is a fall of 300 inches, another, 8 or 10 miles further back, where the fall is not above a fourth or fifth of that quantity, and another half-a-dozen miles further still, where it is almost reduced to a minimum, perhaps is not more than 18 or 20 inches in the year; and all the while there is no visible obstacle to arrest the progress of the rain between these places. In fact, the monsoon, so far as the current of air is concerned, continues its course uninterrupted. It seems that the rain-clouds just curl over the top of the western ghats, and in the course of about 15 miles lose the whole of their excessive moisture. The country beyond gets all the benefit of the coolness and airiness caused by the rain and wind, without the heavy rain itself, and consequently the climate of this country beyond the ghats appears to be, during this rainy season, one of the most delightful in the world. This gives the country about Poonah and along the line of the rail towards Sholapore an arid and treeless appearance.

In the south, towards Dharwar and the Mysore country, the supply of rain is better, and there is not the same aridity. On the Neilgherries the fall of rain is not so excessive as to drive away the European residents, but throughout the rainy season there is much driving heavy rain; and in this respect Ootacamund seems to have no advantage over Simla and the Himalayan stations. In all India there are but two tracts thus deprived of the rains brought up by the south-west monsoon, Scinde and the desert in one quarter, and the Madras coast in another. It is this want of summer rain

which gives their great importance to the irrigation works of the Madras deltas, since the rivers, filled by the immense rainfalls of the western ghats and the moderate periodical rains of the intervening country, are just at their highest when water is most wanted in the deltas, and it is then most easily distributed from the over-filled and overflowing channels.

In the northern portions of the country watered by the western monsoon it appears that, although the coast supply of rain is much smaller than farther south (decreasing from about 180 inches at Mangalore, and 120 in the further Concan, to about 35 in Guzerat), the country in the interior is better watered by the monsoon than farther south in the Deccan. All Central India seems to receive its rain-supply from the west. Berar and Nagpore are well watered, and the neighbouring stations on the northern plateau are moist; Baitool and Seonee are so, and Jubbulpore is, in the rains, decidedly moist and tropical. Mhow is dry, but there is more rain at Neemuch, and Saugor is cloudy and well watered in the rains. It appears that throughout Central India there is a peculiar cloudiness in the rains, so that at Saugor and Jubbulpore the sun is sometimes seldom seen for a month together.

It may be generally remarked of all the countries affected by the direct westerly monsoon that the rain comes with a much more steady and regular wind than in the plain of the Ganges. It may be expressed that the one is a proper monsoon, and the other only a rainy season. This steady wind makes the rainy season cooler and less muggy. The remark, of course, applies in a greater degree to stations more nearly and directly exposed to the westerly monsoon than to those at a distance; but even at Nagpore, at a scarcely greater elevation than Meerut or Delhi, and nearly 500 miles from the sea, the rainy season is very much cooler and more pleasant than at those places. It may, then, generally be said that all the places partaking in the monsoon of the west coast (except those where the rain is unendurably heavy, or where the elevation is too great to make the wind a desideratum) have, altitude apart, a pleasanter climate in the rains than those of the Bengal Presidency, and that as almost all the stations in the interior are placed higher than those of the great plain, without being too high, they are, as a rule, very much pleasanter at that season.

Another branch of the south-western monsoon at the same season affects the greater part of the Bay of Bengal and the eastern side of India. In the southern part of its course this branch is separated from the western branch by the Madras country, and part of the adjacent sea. Rounding the southern extremity of Ceylon, the monsoon takes a south-westerly direction, and thus keeps clear of that

part of the eastern coast which runs nearly due north and south. But as it gets farther up the Bay of Bengal it blows more directly from the south. At Vizagapatam the fall seems to be light; it increases in Cuttack, and is pretty heavy in Calcutta. The total annual rainfall there is about 65 inches per annum. In Eastern Bengal it is much heavier, and on the hills of the extreme east it is enormous, sometimes, it is said, as high as 600 inches in a year.

At Calcutta and in Lower Bengal at this season (and for some time before in the hot weather) the breeze is hardly strong and regular enough to fulfil the idea of a monsoon, but still there is a pretty constant southerly current to which that name may perhaps be given. Proceeding north, this current is again deflected to the west, and so in a weakened and less constant form it proceeds up the plain of the Ganges. It can no longer be called a monsoon, and is very varying and inconstant; but still there is, during part of June and the following months, a general tendency to south-easterly and easterly winds or currents, which bring up the monsoon rains, and to which the country is indebted for fertilising moisture. As a general rule, then, the whole upper plain of the Ganges receives its rain supply from the east; and this supply, though from a contrary direction, is moved by the same impulse, and is, as it were, part of the south-west monsoon. Proceeding farther up the country, the supply becomes less and less, but seldom fails altogether till we pass into the watershed of the Indus system of rivers. It is always heavier near the Himalayas than farther from them. Passing Delhi, the flat country to the left is very scantily watered, but nearer the hills the supply continues. Crossing the Sutlej, the Jullunder Doab is well watered, but at Lahore the supply is scanty and precarious, and farther on the watered country becomes narrower till, beyond the Jhelum, these periodical rains seem to be confined to the hills. Everywhere in the plains the breeze being so light and uncertain, and the rain-supply broken and interrupted, it is frequently or generally muggy and hot throughout the rainy season. In the lower parts of the Upper Provinces, and near the hills, the annual rainfall may be taken to be 40 to 45 inches; further up and further from the hills it diminishes to about 25 inches. In the greater part of the Lower Punjab there is no regular rainy season that can be depended on, and the absence of rain in the tract between the Punjab, the ocean, and the Aravallee range causes the great Indian Desert.

It is not till very high ranges of 13,000 or 14,000 feet intervene that the periodical rains cease in the hills; but far in the interior, beyond those high ranges, they are little felt. In the remote hill-

regions, twelve or fourteen marches beyond Simla, we are nearly beyond their influence. It is the same in Cashmeer, and the rains do not reach into Thibet.

The Bengal branch of the south-west monsoon seems to be, as it were, slewed round to make the north-east monsoon. The country in the east of the peninsula, which receives a share of both monsoons, is rendered moister than those which receive but a scanty share of one. The easterly October rains, though heavy only to the east, seem to extend in a slight shape almost throughout the breadth of the peninsula, being more distinctly perceptible in the centre, and less so in the west.

As respects the rest of the year, northerly currents of air prevail, I believe, for some months on the Indian Ocean. In Calcutta the cold weather air generally comes from the north. In the Upper Provinces there is no very prevailing wind in the cold season, and the nights are usually quite still. In March, April, and May, again, westerly wind prevails in the Upper Provinces, and as the desert and dry country over which it blows becomes heated, these winds become the hot winds of May and June. All round the coast, during the whole season in which the strong monsoon is not blowing, the diurnal sea and land breezes are constant.

I think that I have now mentioned all the main elements affecting the climate generally. Now as to the result on the climate of particular places.

Taking Calcutta, Madras, Bombay, and any good station in the plains of the Upper Provinces, it is impossible decidedly to say which is best; all are so balanced that those who prefer one or the other may, with some reason, maintain its superiority. It may be observed that, for three or four months Calcutta is quite cool enough for ordinary sedentary residents, so cool that the feeling of disagreeable heat is altogether absent. At the same time, the air is not very bracing. Up the country the cold weather is decidedly superior; it lasts longer, is colder and more dry and bracing, without being (till, perhaps we get up as far as Lahore) at all raw or disagreeable. On the other hand, the hot weather in Calcutta, though no doubt very hot, is tempered by the southerly breeze which often makes the evenings almost cool while we are directly within its influence; whereas the heat up-country of the two months from the latter part of April to the setting in of the rains is tremendous.

In the rains, again, the southerly breeze and abundance of rain make the first part of that season in Calcutta preferable, I think, to the Upper Provinces, where there are often very hot breaks in the

weather, and a tendency to muggyness. Later in the season, when the wind fails, Calcutta is much more moist than the drier country; but, then, again, the rains last longer, and there is not so much of the fever and ague which often attend the hot drying up of the rains in many of the less moist stations of the Upper Provinces.

On the whole, I think Calcutta is a dangerous place for new arrivals, but, perhaps, not more trying to acclimated sedentary residents, living there all the year round for a series of years, than would be a similar life at an up-country station. Although healthy people leading an active life up-country may look much better than those who sit in offices in Calcutta, still, for sedentary legislators and administrators fixed for business in the hot and rainy months, there would be no very great advantage of climate at any station in the plains of the Upper Provinces.

Madras being only less warm than at other seasons for a short time in the cold season, and little cooled by the south-west monsoon, has an average temperature higher than any of the places with which I am comparing it. Some people seem to live robustly there to a good age. There are also now excellent facilities for getting away for a change to Bangalore, the Shevaroy, and the Neilgherries.

The country under the western ghats is not so unhealthy as such sub-montane tracts in tropical climates sometimes are. But the low, confined valleys which the sea-breeze does not well reach are decidedly unhealthy. The sea-breeze is everything in those parts; and at all the places on the coast, to be either cool or healthy, you must be actually on the sea and exposed to the direct action of the breeze. Bombay itself is by no means an unhealthy climate. It seems to be pretty free from malarious influences. On the whole, Bombay, taken by itself, seems to be a healthier place than Calcutta, and, taking into consideration the facilities for change, it is much healthier. In the rains, within 120 miles by rail, that is, 7 or 8 hours' journey, is the delightful climate of the Deccan.

It would be useless to carry this comparison farther; the present capitals of the different provinces are sufficiently good instances of the climate of the plains and of the coast; and no other places similarly situated are likely to be chosen to supersede them. To find a better climate we must look to a greater elevation.

At an altitude of 7000 feet, which is about that of our hill sanatoria, we secure a cool European temperature throughout the warm months of the year; and in the northern hills, where there is also a cold winter, the climate might be described as European throughout the year were it not for the marked periodical rains. At Simla and Mus-

sooree the hot weather is, in the day, like the warmest and most sunshiny English summer weather. At Darjeeling, the rains, and more especially the mists, commence earlier and leave off later, and the fall is heavier; there is, therefore, a much smaller proportion of agreeable weather. On the whole the hill climate is probably, in itself, not much less healthy than England, but the confined character of the ground, and the want of room to move about, certainly make the hill stations much inferior to England for the development of a growing human frame.

The summer climate of the Neilgherries is about equal to that of the Himalayan stations; it seems to be mere matter of varying opinion which is preferred. Probably, the greater flatness and roominess of the ground about the Neilgherry stations, and the absence of extremes of climate, render them a better residence for permanent inhabitants of stationary habits. Ootacamund seems to be not altogether free from a little fever, and at somewhat lower elevations in those southern hills fever is unluckily very prevalent. It appears that the fever range runs very high in those parts. The Wynaad and other places, 4000 or 5000 feet high, suffer much from this scourge. It is, therefore, not necessary to consider, as fitted by climate for our purposes, any places at an elevation between the high level of the Neilgherries and the ordinary height of the southern plateau.

The sanatoria on the edge of the western ghats in the Bombay Presidency are not, at the highest point above, 4500 feet; but then they are within the influence of the sea-breeze, which, in the hot weather, is so constant that the heat is never oppressive, even at a less elevation than that which I have mentioned. At this season these places are, probably, at least as healthy as any of the higher hill stations—perhaps more so. Indeed they seem to be, throughout the year, free from any marked unhealthiness. But during the rainy season, the mere force and amount of rain causes them to be deserted; the more so as the much better climate of the Deccan at that season leaves no temptation to remain on the ghats.

A few miles inland, however, on the backs of some of the higher ridges, places may be found where the climate is good all the year round, the rains not being heavier than at Simla or Ootacamund. Of course, as we remove from the direct effect of the monsoon, we also somewhat lose the force of the hot weather sea-breeze; but say at 4000 feet high, within 15 or 20 miles of the edge of the ghats, the breeze is not wanting in the hottest weather, the climate is never disagreeably warm, and, for a permanent residence in an open healthy situation, and among cultivated fields, there are probably

no better sites in India than these; the Neilgherries, perhaps, excepted.

There remain among high elevations only those of the Sautpoora range. Unfortunately it happens that no situation, combining considerable height (I mean something above, say, 3000 feet), space and healthiness is to be found. A good deal of unhealthiness hangs about the whole line of this range. In the north of Kandeish, about the Nerbudda under Mhow, and in the jungles near Asseerghur there is very bad malaria. This unhealthiness of the valleys also, in some degree, extends to many of the wooded hills of the range. The portions of the range which ascend to a high level are very rare and limited, and in point of mere space insufficient. Nearest to the sea, and so far very favourably situated, is the newly discovered Tooran Mull in the north of Kandeish, said by its discoverers to be delightful; but, if so good, it seems strange that it should yet be but imperfectly discovered.

A good way farther east we come to the Chikuldah hills, which form a pleasant local sanitarium for Berar, but they are only about 3000 feet high, are not very healthy in the rains, and are very limited in extent. Pachmarree and Mohtoor are a little higher, but the same remarks apply to them.

The open parts of the adjoining plateau are pretty healthy. Parisnath, though it may be, as I have already suggested, a good place of local and temporary resort from Calcutta, is not fitted for anything larger than that. I repeat, then, that in the Sautpoora range, there is no extensive site with a high elevation and a climate always cool and healthy; so that resource must be abandoned.

I now come to the middle-placed plateau climates at elevations of from about 1500 to 3000 feet.

The southern plateau may be generally described as remarkably healthy. Bangalore is one of the best stations in India. In the north of this plateau, in the Bombay Presidency, the districts near the ghats are the healthiest of all, being free from jungle and from excessive rain and moisture, and, in addition to a considerable elevation of about 2000 feet, having the advantage of a sea-breeze in the hot weather, and of the cool monsoon-breeze already described in the rains. With the exception that the cold weather is inferior to that of northern India, the Deccan climate is clearly vastly superior to anything known in the plains; the hot weather is much less hot and more easily avoided, and the rains are as superior as the best climate can be to the worst. That the climate is, in truth, very healthy to the European constitution is clearly shown by military statistics. The Deccan stations of the Bombay Presidency are, it

would appear, among the healthiest quarters of the British Army. An average of ten years' return in the Appendix to the Report of the Royal Sanitary Commission shows the annual mortality of the European troops at these Deccan stations to be only $1\frac{1}{2}$ per cent. or between 17 and 18 per thousand.

The northern plateau, with the exception of the jungly parts on the southern edge, is generally healthy. Yet here and there the taint of fever slightly extends into the open country. Mhow has a very pleasant and healthy climate; and Malwa is a very fine and very central country. If Malwa had been British territory, it might have been very well worthy of consideration for our present purpose; but as it is not, and there is no prospect of its becoming so, we must put it out of the question. It may, however, be mentioned that Mhow does not seem to have the advantage of climate over the Deccan stations, although the latter are a degree or two south at the same elevation of about 2000 feet. Sangor, in British territory and about the same height, had also a mild and good climate, but besides being very far from the sea it is off the line of the Rail and has no hill sanatoria near it. Jubbulpore again, though one of the pleasantest-looking, and to those with whom it agrees most pleasant stations in India, is unfortunately decidedly feverish. It is perhaps, with reference both to geographical position and to the great lines of communication, the most central spot in all India; and in point of situation, fertility and beauty of vegetation and surroundings, it cannot be surpassed.

On the whole, I think it must be considered that the climate of the higher parts of the northern plateau are not so good as those of the Deccan.

Bombay is, beyond, I think, all doubt or question, destined to be in every way the port of India. Instead of the present great route from Calcutta to the Upper Provinces, the grand route will be from Bombay, through Central India, to the Upper and Northern and even Eastern Provinces, and the second important route will be from Bombay to the South. Bombay, and not Calcutta, must then be the main starting point and basis of Military, Commercial, Industrial, and Social enterprise in the interior of India. The European community must be greatly extended and amplified, new demands will create new supplies; if the present town will not suffice, new towns must rise, around the only good harbour on the west coast of India; and altogether Bombay must advance enormously, and must, it seems to me, in a short period greatly surpass Calcutta, which will be in future only the prosperous capital of rich Bengal.

I conclude, then, that looking to the different elements, European

and Native, and to the early future as well as to the present, Bombay is a place of greater importance and a more powerful attraction in fixing the seat of Government than Calcutta.

I have already expressed the opinion that the permanent capital should be within reach of the sea, and that the Himalayas are thus rendered unfit for our purpose. I also think that, if that objection were over-ruled, still the offices and permanent capital should not be placed out of reach of the ordinary population and traffic, out of the course of affairs, and removed from the practical stir of life to a remote ridge in the interior of the Himalaya.

The Neilgherries are within a moderate distance from the sea, and have very many advantages. But, in my opinion, they are too far removed in a remote corner of India, and too distant from the most important populations and the greatest Political, Military, and Commercial centres. They are also subject to the exception, which I have taken, against places too much isolated by height and climate from the ordinary business and people of the country.

Bangalore is not sufficiently central. We next come to the Deccan high land of the Bombay Presidency. And here I must premise that the most well-known station in the Deccan, viz. Poonah, is by no means the most favourable specimen of that country. Poonah is neither an ancient historical site nor a selection of the British Government. As a place of temporary resort during the rains, probably, convenience of situation and all things considered, no place could be much better. The excessive dryness, barrenness, and aridity of the soil and climate which detract from the place at other times, are rather an advantage during the rains.

But both north and south of Poonah the Deccan presents a much more favourable aspect—is more fertile, greener, and cooler. All the stations to the south, Belgaum, Dharwar, &c., are in these respects superior and have altogether (taking the whole year round) a pleasanter climate. They are also quite as healthy, the average mortality of the European troops nowhere exceeding eighteen per thousand, and they are generally preferred as in every way better stations. Their position, however, to the south and out of the way of the main lines of communication, puts them at a great disadvantage for our present purpose. We must then look to the north of Poonah—and getting to the northern extremity of the Deccan, we come again to the other line of railway, the great line bisecting the country and connecting the great centres of British power and population in India.

If there is anything in the views which I have put forth, the best spot, geographically speaking, is the high land above Bombay, and

if it so happens that the spot thus geographically the best is also a healthy pleasant place, with a temperate climate and a good political situation, the necessary conditions will be fulfilled. I think that they are fulfilled, and proceed to give particulars.

The tract to which I allude is comparatively unknown, having been hitherto cut off from the route of passengers by want of roads. It has now been penetrated by the rail. The Thull ghat is now opened to the public, putting it in direct railway communication with Bombay, distant about 100 miles. No doubt then it will soon be better known and more resorted to; meantime I give the result of my own observations and inquiries, First as to the geographical and political position. The tract in question is the high land over which the Great Indian Peninsula Railway Company's North-East line runs, from about the 85th to about the 150th mile. As regards means of communication, hardly any place can be so central. The main line at Allahabad reaches a great centre of communication. The right or easterly line to Nagpore may eventually, by that more direct route, reach lower Bengal. A left or north line has been already surveyed to Indore, and will, without doubt, eventually reach Agra or Delhi by that route.

When I have shown my plateau to be geographically central and unrivalled in means of communication, the elements of a political centre are almost given. But I may also say that taken from a political and ethnological point of view, the result is the same. We are at the extreme north-western point of the territory of the great Mahratta-speaking race, the greater part of which (in the Bombay Presidency, Berar and Nagpore) is subject to British rule. Closely adjoining is the great Hindostanee race which occupies the north country up to the Sautpooras, and in fact so much overflows to the south that, at the point where we now are, the greater part of the labourers, carters, &c., are Hindostanees, and the Hindostanee language is as current as the Maratta. A little to the north-west is Guzerat. Within twenty or twenty-four hours' journey by rail are all the great seats of Hindostanee population and political action, on the Jumna and Ganges. Another day will bring the Governor-General to the Punjab, to Lower Bengal, or to the farthest parts of Madras. The position, then, relatively to the rest of India being so good, let us examine more minutely the locality itself. I have said that the high land over which the north-eastern line of the Grand Indian Peninsula Railway runs, at an elevation of about 2000 feet, extends from the 85th to about the 150th mile, say for sixty miles; the greatest part of this tract being nearly a plain, varied by a surrounding of hills. This tract is highly cultivated and watered by

several streams, one of which is the infant Godavery, and the others its tributaries. The soil is for the most part a fertile blackish diluvial loam, but not the ordinary black cotton-soil—no cotton grows there. In entire contrast, however, to the Deccan country about Poonah, there is (in addition to the ordinary rain crops) a great abundance of the best cold-weather crops, such as we see in the North-Western Provinces; a very large breadth of wheat, and also sugarcane, tobacco, oilseeds, gram, &c., &c. Trees thrive extremely well and look well-grown, green and healthy. The breadth of the open tract being so considerable, it is in no degree rendered hot or close by the hills, which on its outer circle nearly surround it, and which, looking from so considerable an elevation, do not seem very high. But these hills supply on all sides a great abundance of small perennial-running streams, easily used for purposes of irrigation, and which give this country a cheery, well-watered look. At the same time it is entirely free from anything like stagnation, jungle or miasma; the culturable part is exclusively occupied by cultivation, and the rainfall being small (as I have explained it to be in all the Deccan country behind the ghats) the hills are free from jungle, except on the western face of the ghats, looking the other way.

As a fair specimen of this plain of the Upper Godavery, let us take Nassick, the head-quarters of the Civil Establishments and within 5 miles of the railway. This place is by rail, if anything, nearer to Bombay than Poonah, being 116 miles to 119, the distance of Poonah. The ghat ascent is also somewhat easier. Nassick is about the same height as Poonah—rather higher than lower. The town is a compact, high built, tile-roofed place on the banks of the Godavery, of 20,000 or 30,000 inhabitants. The surrounding country is very fertile and well watered, abounding in groves, gardens, wells, and small canals. The mango-trees (their appearance is a great test in India) are as well-grown and thriving as in any place which I know, and there is a feature which I had never seen elsewhere in India, viz., many great native vineyards. Several single vineyards cover many acres each, the vines being trained high, over trees planted and pollarded for the purpose, after the Italian fashion. The vine is a great test of climate, and I fancy of healthiness. The climate is what I have before in general terms described the Deccan climate to be. Being the most northerly point of the Deccan, there is the best cold weather, without so much of a bitter, dusty wind as farther south. The rainy season is somewhat cooler than at Poonah, and in every other respect quite as pleasant. One more advantage of this same part of the country I

must add, viz, the facility for getting down in a few hours to the sea-air and sea-bathing of the cool season on the coast, on the line of the Bombay and Baroda Railway. No part of the country is more healthy than Nassick and the surrounding district.

I would propose then to select for the capital some suitable spot of this kind in the plain of the Upper Godavery, coupled with a roomy sanitarium available within a couple of hours. Between the railway station and Nassick there is a high, dry and very open site, at present somewhat bare for want of water. If water were brought upon this spot, from a few miles up the streams on either side, it might be a very admirable location, or many others might be selected and compared. The ghats, backed by the sea on one side, and these hills on another, would go far to make the capital impregnable on those sides. On the north the deep jungly valleys of the Taptee and Nerbudda, and the intervening hills, would be a sufficient defence. On the north-east it would only remain to take advantage of the north wall of the Deccan—the Chandore range, through which the railway passes to Kandeish. If it should be necessary, the few passes might no doubt easily be rendered defensible. On the east the valley of the Nerbudda would be easily held. In this elevated plain we should have, as it were, the capital in a great park of 50 or 60 miles in diameter, enclosed in a complete ring-fence. That capital would be a pleasant, healthy place in a good climate, and the European houses would be surrounded by gardens and vineries, and all things pleasant to the eye, which are so essential to a permanent abode. There would be an abundance of pleasant country, abounding in European residents and residences in the neighbourhood, and the most abundant opportunities for change of air, to cool hill-climates for those who wish to avoid the heats of the hot weather, and to sea-shore and sea-bathings for those who wish to avoid the chills of the cold weather, or the early heats of March. For seven, eight, or nine months the work of Government would go on uninterruptedly. For two or three or four or five months in the cold season, as the case might be, the Governor-General and the Members of the Government would be free to visit all India.

The PRESIDENT explained that Mr. Campbell was a gentleman of great distinction in the Indian Government, long resident in India, who in his vacations had explored a great part of the country, with the view of ascertaining the best site for a capital. The paper was of value as a review of Indian geography, and should lead to the construction of a better map of India than the one which the Society at present possessed. He hoped before another paper on this subject was read that they would be able to exhibit a satisfactory map of Hindostan, from the Himalayas down to Cape Comorin. With regard to the subject

discussed in the paper, he saw present several gentlemen of high distinction, who had passed many years in India; and he should be glad to hear observations from them concerning the climatology and geography of the country in connection with a proper site for a capital. With regard to Nassick, the place selected by Mr. Campbell as the best site, it appeared that this town had been the seat of a college of the Brahminical priesthood. He had no doubt that these learned men, like the monks of old in our own country, knew how to select the most salubrious spots for their residence.

Mr. W. J. HAMILTON (Chairman of the Great Indian Peninsula Railway) said it was only that afternoon he heard incidentally from the President that this was to be the subject of discussion; therefore he was not prepared to say more than that as the Great Indian Peninsula Railway passed through the district, it must be an object of great interest to them that such a position should be chosen as the future capital of India. He had often heard it stated that in the future the capital of India must be changed. Calcutta was too far off, too much out of the line of immediate communication with Great Britain, to be the appropriate capital of India. Bombay had been suggested as the future capital, as soon as the different lines of railway from Bombay, the nearest port to England, shall have been constructed across the Peninsula to the north-east and the south-east. But there were great difficulties connected with that site. The island of Bombay was very small: it was already overpeopled, and it was extremely difficult to find proper accommodation for the increased population brought to Bombay by the increase of commerce, and more particularly in consequence of the impulse that had been given by the construction of these railways. With regard to Nassick, there seemed to him, from comparing the observations which the author of the paper had made with what he had himself heard upon the subject, a certain amount of contradiction. In the first place, Mr. Campbell alluded to this district as being particularly well watered. It might be so; but the greatest complaint and the greatest difficulty which they had had to contend with in the construction of the railway from the top of the Ghauts into the valley of the Taptee had been the difficulty of supplying water even for the engines. In the next place, Mr. Campbell said Nassick was surrounded with meadows, rivers, rivulets, and canals; and yet he assumed that it must be a healthy position. Considering the climate of India, there seemed to him a certain amount of contradiction in that statement. However, that was a question which could be more accurately entertained and examined hereafter.

Sir ROBERT MONTGOMERY stated that Mr. Campbell, who was a personal friend of his, was one of their most able writers in India; yet, at the same time, he (Sir Robert) could not agree with the conclusions that he had come to as to the necessity of changing the capital from Calcutta. Was it necessary that a capital should be central? Looking to the different capitals of Europe—London, Paris, and St. Petersburg, were not central; nor was Washington, the capital of the United States of America. At Calcutta the Governor-General had other interests committed to him besides the government of Hindostan. He had charge of the affairs of Pegu and Penang, and although he was not directly charged with affairs in China, he was the chief medium of communication between England and that empire, and, in cases of difficulty, reference was made to him for advice and assistance. Therefore, with reference to China on the one hand, and Hindostan on the other, Calcutta did occupy a central position. Again, Calcutta was the centre of everything European in India. It was from thence our Indian empire began, and expanded. Our law courts, public offices, and great mercantile establishments were there. The great indigo-planters and tea-planters of the valley of the Ganges had their head-quarters in Calcutta. There were more Europeans in Calcutta than in the whole of the rest of Hindostan; Bombay and Madras included.

It was of great importance that public opinion should be brought to bear upon the government of India; and it was only in Calcutta that this could really be done, where there was a large European population and an ably-conducted press. Would there, then, be no loss of prestige in leaving Calcutta? A former Emperor of Delhi tried to remove his capital, and did not succeed. As regarded railways and telegraphs, he should himself consider that the construction of these would do away with the necessity of removing from Calcutta. A telegraph message from London would reach Calcutta and Bombay almost simultaneously, and despatches would reach Calcutta in perhaps twenty-four hours from Bombay. Again, he held that the Governor-General should not remain at the capital, except during the Legislative Session of four months or so, and that during the rest of the year he should be moving about India, going to Bombay, Madras, Birmah, and other parts of the empire; not with the state and ceremony and retinue of former times, but travelling by the railroad accompanied by a moderate staff of officers, and holding durbars, wherever it was necessary to produce an imposing effect upon the natives.

Sir CHARLES TREVELYAN said that the present question was in its essence political. The barest statement of the political question would indicate within narrow limits where the future capital ought to be. The political system of India was a system of local governments, and the part of the supreme government was to superintend and control the local administrations, to direct the resources of the empire to one common object, and to administer certain departments, such as the Post-office and Foreign Affairs, which were common to the whole. The capital ought not to be at the seat of any one of the local governments because it would interfere with the authority and diminish the responsibility of the local government. Sir Robert Montgomery had truly stated that the most wealthy and influential of our provinces was Bengal. It was full of resources, developing more rapidly than any other part of India; and the European element there was the strongest and growing the fastest. Yet, strange to say, this rich and powerful province was governed by a Lieutenant-Governor, unassisted by any Council, with secretaries with very inferior salaries; and the embarrassments which had attended the administration of the government of Bengal was in a great measure to be attributed to this weak and defective character of its government. If the Governor-General did not happen generally to reside at Calcutta, the necessity of giving to Bengal a fully constituted government on the footing of Madras and Bombay would be at once apparent. Another objection to the supreme government being placed at the seat of any one of the local governments was, that it would be unduly influenced by the experience and views of the province in which it was placed. While recognising to the full extent the important influence of public opinion, he contended that the European and Native opinion by which the supreme government should be influenced, ought not to be that of any particular province, but the opinion of the whole of India. Another objection to Calcutta, Bombay and Madras, was that they were situated on low land near the coast, in a hot relaxing climate, unfavourable to continuous vigorous mental exertion, and that they were on the extremities of the empire. The practical effect of these last objections was, that the Governor-Generals were absent half their time from Calcutta—formerly without their Councils, which led to great evils; and now the entire government is removed twice a year, at great expense and inconvenience, between places as distant from each other as London and Constantinople. If these premises were correct, the conclusion was inevitable that in determining the seat of the new government the *sine quâ non* was that it should be central—so situated as to be in the easiest and most direct communication with all the local governments, so as to supervise them with the greatest possible effect and with the fullest possible knowledge of what was going on. Mr. Campbell had seen the great importance of this question, and

had carried us a long way towards the solution of it. But the site selected by him was not sufficiently central, and he had not fully considered the question of public opinion, that it should be the public opinion not of Calcutta or Bombay, but that of the whole of India. He (Sir C. Trevelyan) therefore thought the capital should be somewhere in the centre of the continent, on the line of the Great Indian Peninsula Railway. The question had not arrived at the stage which required that any particular spot should be fixed upon. We shall be better able to judge after the stream of railway travellers has passed for some time between Bombay and Calcutta, and after the Government has instituted inquiries on the subject. But if he were obliged to indicate the proper position, he should name the high, healthy table-land of Central India, where the new capital would have Calcutta on the right and Bombay on the left, and would be in direct railway communication with Madras, Allahabad, Agra, Lahore, and other important places. Hitherto our policy had been to cling to the sea-coast, as a kind of citadel, and our influence had only partially penetrated into the interior; but now that the results of the mutiny had established our supremacy in the minds of the natives, and they had entered upon a course of European education and European civilisation, we should not be afraid of placing the capital of India in the centre of the country. It would establish in the heart of India a new focus from which English and Christian influence would radiate. It would be a strongly-seated powerful English colony, and would thus be an additional security and would contribute to prolong our rule.

SIR ERSKINE PERRY said the question had been on the *tapis* for the last twenty or thirty years. The objections to Calcutta were obvious. It was very remote, it was in a bad climate for Europeans, it was a long way from those climates that suited Europeans, and the consequence was a severance of the government from the capital during many months of the year. Still, the question recurred, and had not yet been answered, where to fix on a better site. The problem to be solved was this: in choosing a site for the capital of India you have to suit two very different habitudes—the conquering race who belong to northern latitudes, and the conquered race who belong to the tropics. What suited one did not suit the other. Calcutta was an admirable place for the Bengalese; but it was very distasteful and disagreeable to the European community. Still all the great things in India had been done there. There Warren Hastings lived and built up our empire, and there for the last hundred years all the great men who belonged to that part of India have passed their lives in the employment of their country. The outcries against Calcutta had been, therefore, much exaggerated. On the other hand, when men were sent out from this country, of forty or fifty years of age, they found the climate extremely disagreeable, and they got away from it as soon as they could. He thought Mr. Campbell had been in some respects happy in the selection of a site. It was a central point, near to the sea, near to a large harbour and a large independent European community, and near to a range of hills where Europeans could find a suitable climate during the hot season, and have their residences there, just as many of the inhabitants of London had in the suburbs. The objection that occurred to him was that the plateau in question, like all the Deccan, is for the most part very barren. It is at an elevation of 2000 feet, with little rainfall, and therefore extremely dry: there are no rivers and no water to make the soil fertile. Mr. Campbell said that Nassik was full of springs, wells, orange-trees, and vines. That might be perfectly true; but these resources, which were sufficient for a limited population of a few thousand people, would not suffice for the population of the capital of British India. Moreover, all articles of food were 50 per cent. dearer in that part of India than in the fertile plains of Bengal. He was glad this question had been brought up in the Geographical Society, because it was desirable, as in most Indian ques-

tions, to turn the educated mind of England on topics of this description. As one who had passed his whole life in the consideration of Indian questions, he frequently regretted that this, the most magnificent appanage that ever belonged to any empire in the world, was so little understood, so little cared for, and so little thought of, by the inhabitants of England.

Sir HENRY RAWLINSON said it was impossible to exclude from the discussion all political considerations; but, at the same time, as members of the Geographical Society, it should be their endeavour to base their observations, as far as possible, on the geographical part of the question. Sir Erskine Perry had truly remarked that the whole question lay in a nutshell; it was a choice between Calcutta and somewhere else. Calcutta was in a very bad climate, it was in a corner of India, and it was the furthest removed from England of all the proposed sites. The importance of communication with England had not received sufficient attention. He did not mean telegraphic communication, but postal communication. Many of them might be aware that Bombay was in process of being made the postal port of India. It was the unanimous recommendation of a Committee of the House of Commons last year, and he believed arrangements to that effect were actually in the course of completion. This would make it almost a matter of necessity that the seat of the central government should be within a convenient distance of Bombay; and he agreed with Mr. Campbell that it should be some place above the Ghauts, in a good climate, and on the line of some great railway. But he was not prepared to desert a well-known station like Poonah in order to go eighty or ninety miles to the northward, and settle down in a desert like Nassick. We should lose prestige, and should lose, moreover, the advantage of all the necessary preparations for a capital which we have at Poonah. Ever since the battle of Kirkee, Poonah had been a great European settlement; it had gone on increasing from year to year, and it enjoyed at present a large amount both of English and native prestige. He should certainly vote in favour of Poonah in preference to Nassick. With regard to grapes, Poonah and the whole of the Deccan had its grapes equally with Nassick. In respect to climate, he did not think there was anything to choose between Poonah and Nassick. Sir Erskine Perry had observed that throughout the Deccan there was a difficulty of obtaining supplies. That objection would, no doubt, apply to all the proposed sites. But he did not see the necessity of the seat of government bringing a very large population around it. It was not the case at Washington, nor would it be the case here. There would be no commerce, like that of Bombay and Calcutta, nor any of those attractions for the native population which towns on the sea-coast presented. Therefore the question of supplies was not one of paramount importance. With regard to water, Poonah was better supplied than Nassick. There were two rivers which joined at Poonah, and furnished a supply of water amply sufficient for present necessities; while with dams and reservoirs the supply might be doubled or trebled. Then, in the vicinity were the hill forts of Singhar and Poorundhar, within a few miles of the cantonment, and possessing the best climate throughout the whole of the Deccan, much better, indeed, suited for European constitutions than the hills about Nassick. He knew Nassick only as a sportsman; he had never resided there, nor had he seen any sanitary reports of it. But he had heard that the jungles in the vicinity were unhealthy, whereas Poonah and its neighbourhood were notoriously healthy.

2.—*On the Inland Navigation of Travancore; an account of the Alipee Mud-bank and the Wurunkallay Barrier.* By C. R. MARKHAM, Esq., Secretary R.G.S.

THE backwaters on the Malabar coast of India form an inland water-communication traversing nearly the whole length of Cochin and Travancore, and continuous from Trivanderum to the railroad at Ponary, except at one point, the Wurunkallay Barrier. The author visited this spot in December, 1865. The barrier is formed by a spur of the ghauts extending to the sea, about 6 miles broad, with a summit-level of 180 feet. From the backwater on the south of the barrier a ravine runs up to within half-a-mile of the summit of the ridge, and from that on the north there is another ravine which also indents the side of the ridge. A plan for cutting through and tunneling the barrier, to complete the system of inland navigation in this part of India, has been proposed by the Travancore engineer and adopted by the Government.

The mud-bank of Alipee, the Port of Travancore, is a curious phenomenon. The safety of the roadstead arises from its possessing a remarkably soft muddy bottom, and the fluidity of the water being diminished by the intermixture of mud the anchorage is very smooth in four fathoms, even while the swell of the monsoon is at its height in the offing. Its formation, according to the explanation given by Mr. Crawford, the commercial agent of the Travancore Sirkar, is due to the hydraulic pressure of the waters of the backwater on the fine silt of the bottom, forcing it by subterraneous passages under the coast belt of land; the pressure arising from the level of the backwater being, during the height of the monsoon, four feet higher than that of the ocean. At low-water in this season a series of mud-eruptions are observed to form on the beach.

This paper, with illustrative Maps, will be printed entire in the Journal, vol. xxxvi.

Sixth Meeting, February 11th, 1867.

SIR RODERICK I. MURCHISON, BART., K.C.B., President, in the Chair.

PRESENTATIONS. — Carleton L'Estrange, Esq.; D. MacLoughlin, Esq., M.D.

ELECTIONS.—Colonel Shafto Adair; George H. Wilson Brown, Esq.; E. Butler, Esq.; Rev. P. Butler (Rector of Ulcombe); Leonard Crane, Esq., M.D.; Charles John Ely, Esq.; John Langlands, Esq.; Guillermo

E. de Marthin, Esq. (Consul-General of the United States of Columbia.

ACCESSIONS TO THE LIBRARY SINCE THE LAST MEETING.—*Donations.*
 'Report on the Chemical Laboratories in course of erection in the Universities of Bonn and Berlin,' by A. W. Hofman, LL.D., F.R.S.: presented by the Lords of the Committee of Council on Education. 'Libro del Saber de Astronomia del Rey Don Alphonso X. de Castile:' by the Royal Academy of Sciences of Madrid. 'Notes on a Journey from Bida in Nupe to Kano in Hausa, in 1862, by Dr. W. B. Baikie, R.N.:' by the Foreign Office. 'Journal of J. G. Macdonald, Expedition from Port Denison to the Gulf of Carpentaria:' by the Colonial Office. 'A Journey to Ashango Land, and further penetration into Equatorial Africa,' by Paul B. du Chaillu, with map and illustrations: by the author. 'Index of 17 volumes of Bombay Geographical Society,' compiled by D. J. Kennedy: by the Society. '1619, Viaggi della Valle,' H. Pellegrino: by Mr. Gibb, F.R.G.S. 'Interoceanic Railroads and Canals—Reports to the U.S. Secretary of the Navy on Canals and Railways between the Waters of the Atlantic and Pacific Oceans,' with maps, &c., by R. Davis and G. Wells: by Admiral Davis, U.S.N. 'Comparisons of Standards of Lengths of England, France, Belgium, Prussia, Russia, India, Australia:' by the Secretary of State for War. 'Zeitschrift der Deutschen Morgenländischen Gesellschaft:' Dr. Ludolf Krehl. Eyles Irwin's work, 'A Series of Adventures in the course of a Voyage up the Red Sea in the Year 1717.'

ACCESSIONS TO MAP-ROOM SINCE THE LAST MEETING.—A Sketch-map showing the route of Mr. Colvill from Bushire to the Port of Lingah: presented by the Government of India. Plan of the English Settlement at Shanghae; published by the Municipal Council of Shanghae: presented by J. Pook, Esq., F.R.G.S.

The PRESIDENT informed the meeting that Lieut. Alwin S. Bell, who was stationed with his regiment (3rd West Indian) at Sherbro, on the West Coast of Africa, during the years 1864-5, had communicated to him a letter from the unfortunate traveller M. Jules Gérard, of which the following is a translation. The death of the traveller, by drowning in crossing the river Jong, took place within a month of the date of the letter, and Lieut. Bell adds that it was not known at Sherbro whether the capsizing of the boat was an accident or done intentionally by the natives:—

"Mano, Lat. 8° 10' N., 21 July, 1864.

"MY DEAR M. HUCHARD,—The first chiefs with whom I entered into relations, on my arrival in the Kasso country, having taken me some for a trader and others for a slave-dealer, all used their endeavours to retain me in their dominions, with a view either to sell me slaves or to induce me to establish myself among them. Actuated by these motives, they closed to me the routes into the interior, and concealed the fact that the Kasso people have

a superior chief,—a king without sceptre, but more feared and respected than a king. Having obtained this information towards the end of my sojourn at Matapen, I pretended to take the route of Sierra Leone, and thus on the fourth day of my march arrived at Mano, the residence of Bagon, the supreme chief I have spoken of. I was received by him in the most friendly manner. He showed me, soon after my arrival, the river Tayei, which is the principal affluent of the Mongray, and flows from the Kissi and Sangarah countries, forming two branches. The eastern branch traverses the Kono country, the western the Kouranko district. These two branches are navigable without interruption for eight days' journey above Mano, and their banks are as thickly populated as the Boum country, excepting the factories.

"Bagon has a great wish to have a factory, and with a view to this has given me most useful information concerning the productions of the country, such as cotton, palm-oil and palm-nuts, ground-nuts, ivory, and ebony. Ivory is very abundant here, and has no value. Bagon told me that if I was willing to stay with him he would send his troops to hunt elephants, which abound in his forests, and obtain plenty of ivory for the factory. Cotton may be obtained for 3*d.* or 4*d.* a pound, seeded and cleaned; that is, 4*d.* in goods at their value here, which is equivalent to 2*d.* on the coast. Rice and other products of the soil have no price. This locality being so desirable a situation for a trading post, I have decided to remain some time and make a trial of it. If my speculation succeeds, I shall fix myself here; if not, I shall only have to recover the payment for my goods, with the profits, and then continue my journey towards the north.

"I must not forget to tell you that, besides the road by water direct to Sherbro, there is a road by land which leads, in two days' march, to Matapen. To make a trial in trade at Mano I address myself to you. If my proposition suits you, have the goodness to despatch the first lot of goods, with an agent if possible. If you have not one at hand, I will employ in the mean time the interpreter whom I brought from Matapen, and who has for a long time worked at trading stations. If you send the goods, send Aly forward with a letter informing me of the probable date of their despatch and the route taken, whether by land or water. Whichever road you choose, Bagon will send his people to meet your messenger at Matapen if it is the land-route, and at Mongray if it is by water. As to the conditions on which you send the goods and receive produce in payment, you may fix your own terms. If my proposal does not suit you, let me ask of you to do me the favour of facilitating Aly's journey to Sierra Leone.

"JULES GÉRARD."

The PRESIDENT said the members of the Society must all lament the loss of M. Jules Gérard, who was present in that room shortly before his departure on the expedition which proved fatal to him. The country in which M. Jules Gérard was supposed to have been murdered was very little known to geographers. The project that he had in view at the time of his death was, perhaps, the most adventurous of any of the travels of modern times. It was no less than to proceed from the west coast, near Sierra Leone, to Timbuctoo, and thence to the French settlements in Algeria, where he had distinguished himself in former years as "the Lion Killer."

The following Papers were read:—

1. *Ascent of Mount Hood, Oregon.* By the Rev. H. K. HINES.

[Extracts.]

THE Cascade range of mountains is a northward continuation of the *Sierra Nevada* of California, and traverses the state of Oregon and

the territory of Washington from south to north, at a distance of 100 miles from the Pacific Ocean. This range springs up to an average altitude of 8000 or 10,000 feet, while, at intervals of many miles, more aspiring summits, from 5000 to 8000 feet higher, rise above the evergreen roofing of the lower mountains. The highest of these is Mount Hood. It stands about 50 miles south of where the Columbia has ploughed its way through the Cascade Mountains, and in the centre of that range from east to west.

In September of 1864, in company with three gentlemen of Vancouver, I first attempted to reach the summit of Mount Hood. On reaching an altitude about 800 feet below the summit, a dense cloud came sweeping against the north side of the mountain, and, drifting rapidly over it, instantly enveloped us in its folds. The air changed suddenly to a fierce cold. The driving snow filled the air so entirely that a cliff of rocks 300 feet high, standing not more than fifty feet from us, was invisible. To go up or to go down, was, for the time, alike impossible. One of my companions was chilled nearly to insensibility, but we struggled against the tempest for hours, unwilling to be defeated in our purpose to reach the summit.

On the morning of the 24th of July, 1866, in company with three gentlemen of the city of Portland, Oregon, I set out full of determination to stand upon the summit, if energy and endurance could accomplish the feat. Our rendezvous was at the house of a Canadian, who, fourteen years before, had erected a cabin at the place where the emigrant road leaves the mountains and enters the valley of the Willamette. From this place the track enters the mountains along the gorge through which flows a dashing river about 300 feet in width, which rises beneath the glaciers of Mount Hood. Up this stream we travelled for 30 miles, when, leaving the gorge, the way makes a *détour* to the south to gain the summit ridge. Here is the celebrated "Laurel Hill." For three or four miles the ascent is continuous, and in many places very steep.

Reaching the top of Laurel Hill we were on the general summit of the range: a comparative level of perhaps 10 miles in width, whose general character is that of a swamp or marsh. On this plateau is a dense and grand growth of fir, cedar (*Thuja gigantea*, Nutt.), pine and kindred evergreens, with an almost impenetrable undergrowth of laurel (*Rhododendron maximum*, Hook.). Straggling rays of sunlight only here and there find way through the dense foliage to the damp ground. Passing over this level we crossed several bold clear streams, coursing down from the direction of Mount Hood, and then, turning to the left, we took an old Indian

trail leading in the direction of the mountain. After a ride of an hour and a half up a continuous and steep ascent, we came to an opening of scattered trees which sweeps around the south side of the mountain. It was about five o'clock when we emerged from the forest, and stood confronting the wonderful body of rock and snow which springs up from the elevation.

We selected a place for our camp on a beautiful grassy ridge between one of the main affluents of the Deschutes River and one of the Clackamas, and which nearly constitutes the dividing ridge of the mountain. Having erected here a hut of boughs and gathered fuel for a large fire during the night, we spread our blankets on the ground and slept well until the morning. We picketed our horses in this place. At seven o'clock of Thursday we were ready for the ascent. For the first mile and a half the ascent was very gradual and easy, over a bed of volcanic rock, decayed and intermixed with ashes. Huge rocks stood here and there, and occasionally a stunted juniper found precarious foothold; some beautiful variegated mosses were also seen clinging to little knolls of sand. We soon reached the foot of a broad snow-field, which sweeps around the south side of the mountain, several miles in length, and extending upward to the immediate summit. The first part of this ascent is comparatively easy, being smooth, and only in places so steep as to render the footsteps uncertain. Near the upper edge of this field of snow the deep gorges, from which flow affluents of the streams Deschutes on the right and Sandy River on the left, approach each other and seem to cut down into the very foundation of the mountain. The waters were rushing from beneath the glaciers, which, at their upper extremity were rent and broken into fissures and caverns of unknown depth.

The present summit of the mountain is evidently what was long since the northern rim of an immense crater, which could not have been less than 3 miles in diameter. The southern wall of the crater has fallen completely away, and the crater itself become filled with rock and ashes overlaid with the accumulated snows of ages, through the rents and chasms of which now escape smoke, steam and gases from the pent-up fires below. The fires are yet so near that many of the rocks which project upward are so hot that the naked hand cannot be held upon them. Just at the south-west foot of the circular wall, now constituting the summit, and at a distance of near 2000 feet from its extreme height, is the main opening of the crater. From this a column of steam and smoke is continually issuing, at times rising and floating away on the wind, at other times rolling heavily down the mountain. Into this crater

we descended, as far as it was possible to go without ropes or a ladder. The descent was stopped by a perpendicular precipice of ice 60 or 70 feet high, resting below on a bed of broken rock and ashes so hot as immediately to convert the water, which dripped continually from the icy roof 100 feet above, into steam. The air was hot and stifling.

At this point the real peril of the ascent begins. It leads out and up the inner wall of what was once the crater, and near 1000 feet of it is extremely steep. The whole distance is an ice-field, the upper limit of a great glacier which is crushing and grinding its slow journey down the mountain far to the right. About 700 feet from the summit a *crevasse*, varying from 5 to 50 feet in width, and of unknown depth, cuts clear across the glacier from wall to wall. There is no evading it. The summit cannot be reached without crossing it. Steadily and deliberately poising myself on my staff, I sprang over the chasm at the most favourable place I could select, landing safely on the declivity 2 or 3 feet above it, and then with the staff assisted the others to cross. The last movement of 15 feet had considerably changed the prospect of the ascent. True, the crevasse was passed, but we were thrown directly below a wall of ice and rocks 500 feet high, down which masses, detached by the heat of the sun, were plunging with fearful velocity. To avoid them it was necessary to skirt the crevasse on the upper side for a distance, and then turn diagonally up the remaining steep. It was only 700 feet high, but it was two hours' sinewy tug to climb it. The hot sun blazed against the wall of ice within two feet of our faces, and the perspiration streamed from our brows, but on nearing the summit the weariness seemed to vanish, and with a feeling of triumph we bounded upon the pinnacle of the highest mountain in North America.

The summit was reached at about the centre of the circular wall which constitutes the extreme altitude, and it was so sharp that it was impossible to stand erect upon it. Its northern face is an escarpment several thousand feet high. I could only lie down on the southern slope, and, holding firmly to the rocks, look down the awful depth. A few rods to the west was a point 40 or 50 feet higher, to the summit of which we crawled, and then discovered that 40 or 50 rods to the east was a point still higher, the highest of the mountain. We crawled back along the sharp escarpment, and in a few minutes stood erect on the highest pinnacle. This was found to be 17,640 feet high, the thermometer standing at 180°, about 40 feet below the summit, when the water boiled—giving

32 degrees of depression. This estimate makes Mount Hood higher than any summit of Europe or North America.

The view from the summit was magnificent. From south to north the whole line of the Cascade Range is at once under the eye, from Diamond Peak to Ranier, a distance of not less than 400 miles. Within that distance are Mounts St. Helen's, Baker, Jefferson, and the Three Sisters; making, with Mount Hood, eight snowy peaks. Eastward the Blue Mountains are in view, and lying between us and them are the broad plains watered by the Deschutes, John Day's, and Umatilla rivers. On the west the piny crests of the coast range cut clear against the sky, with the Willamette Valley sleeping in quiet beauty lying at their feet. The broad silver belt of the Columbia winds through the evergreen valley towards the ocean. Within these limits is every variety of mountain and valley, lake and prairie, bold beetling precipices and graceful rounded summits blending and melting away into each other. It was with reluctance that at length we took the first step down the declivity.

The descent to the great crevasse, though much more rapidly accomplished, was quite as perilous as the ascent from it. We were now approaching the gorge, and a mis-step might precipitate us into unfathomed depths. Less than half an hour was sufficient to retrace the weary climbing of two hours, and standing for a moment on the upper edge of the chasm, I bounded over it where it was 8 feet wide. The impetus of the leap sent me sliding a long distance down the icy steep below.

In two hours and a half from the summit we were in our camp. At dark we began to pay the price of our day's work. The glare of the sun on the ice had burnt our faces and affected our eyes until they became so painful that we could not sleep. I kept on my eyes and face all night a cloth wetted in ice-water, and in the morning was able to see, but two of the party were quite blind for forty-eight hours.

Olympia, Washington Territory, U. S.,
10th Nov., 1866.

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2. *A Journey across the Cascade Mountains into Eastern Oregon and a Description of Idaho Territory.* By ROBERT BROWN, Esq., F.R.G.S.

[Extracts.]

THE Oregon of to-day is not in geographical extent the same as previous to the Ashburton Treaty of 1846, when it was not very distinctly defined, stretching from the Californian boundary up to near

the Russian possessions. At that period all the country south of 49° N. lat., or the Straits of De Fuca, was declared to be United States' territory, and all north of that to the Russian boundary, or what is known as British Columbia and Vancouver Island, to belong to the crown of England.

Then, with increasing population flowing into the rich valley of the Willamette, the territory of Washington in 1853 was separated from Oregon; but, what with Indian wars and other adverse circumstances, its population has somewhat decreased, and does not number more than between 11,000 and 12,000. The country east of the Cascades is thinly populated, save by Indians, and the region to the west of that range is for the most part very thickly wooded, and in some cases very wild and inaccessible.

The territory of Idaho ("Star of the Mountains") was organised out of portions of Washington, Nebraska, and Dakota. For the most part it is a mere desert, and, with the exception of the rich bottoms of the numerous rivers, the wealth of the country consists in the gold and silver mines. It is terribly harassed by Indians, little explored, its civilised population very floating, estimated at about 22,000, and its area about 326,333 square miles. It is a rich mining region, and is likely eventually to become of importance. Three years ago a portion of California, comprehending the region of the Sierra Nevada and the great silver-mines of Washoe, was erected into the state of Nevada. We must not, however, allow ourselves to be misled by the division of these wild countries into counties, &c.; some of the counties having no population, or so little as to be of very small moment, and not a few of the "cities" consisting of a tent, two dogs, and a bob-tailed horse,—as a city which I discovered on the Columbia River last summer did! The state of Oregon proper contains about 60,000 people (a portion very migratory), and an area of about 82,248 square miles, or 60,958,720 acres. This population is principally contained in the beautiful valleys of the Willamette, Umpqua, Rogue River, and Lower Columbia, to the west of the Cascades, and in the little towns on the Upper Columbia to the east. Portland,* on the Willamette, with 8000 inhabitants, is the largest town.

Magnificent steamers navigate the Columbia, with occasional breaks, into the British possessions, and the Willamette at all seasons to Oregon "city," 10 miles above Portland. At high water they navigate the river above the falls for between 200 and 300 miles, to a few miles above the town of Eugene.

* Salem, a small town (lat. $44^{\circ} 56' 51''$ N, long. $122^{\circ} 53' 43''$ W.) is, however, the capital.

The whole country east of the Cascade Mountains is very wild, inhabited almost entirely by wild tribes of Indians, and it was over this tract, described on maps as "unexplored," that the descriptions contained in this paper refer. I may explain how it was that I am the historian of it. In July, 1865, I arrived with my Indian servant at Eugene city (lat. $44^{\circ} 2' 44''$ N.), in the valley of the Willamette, a very out-of-the-way place at best. For the whole summer (indeed, for several summers past) I had been leading a vagabond sort of life among the Indian tribes in the wild country on the Pacific slopes of the Rocky Mountains,—now an explorer, now a naturalist, at one time leading an extensive exploring expedition, at another wandering all alone through the solitary valleys and by the banks of mountain streams.

I proposed from Eugene to cross into the wide region to the east of the Cascade Mountains into the Snake Indian country, confident that my long familiarity with Indian character would render my solitary journey as safe as it had hitherto been from these wild rovers; but on mentioning the subject to my gallant friend General Applegate, I was assured (only in a much more expressive manner) that if I had ten lives and the same number of scalps, instead of only one, I should have barely enough to pay my "footing" in that region! At the same time, for my consolation, I was informed that a party of dragoons were about going over that region as an escort to some gentlemen interested in an attempt to find a route over Eastern Oregon to the territory of Idaho, and that he would use his influence to allow me to travel under their escort.

Thus I travelled to Fort Klamath, where I left the party, and reached Southern Oregon. The rest proceeded over the country to Owyhee River, on much the same track as that explored by Colonel Drew in the preceding year.

In California there are published a number of maps, comprising some attempt at portraying the explored parts; but these are only ephemeral productions, brought out often at great expense to illustrate some newly-discovered gold-mines, and as they are after the collapse of these forgotten, they may be said to be almost unpublished. They are—'Map of the Mining Sections of Idaho and Oregon, showing the Gold and Silver Mines of Boisé and Owyhee, by George Woodman; compiled chiefly from notes of his travels and surveys during the last 18 months' (San Francisco, A. Censoul, 1864) 'Bancroft's Map of Oregon, Washington, Idaho, &c.' (Bancroft, San Francisco, 1864). 'Map of the Territory of Montana with portions of the adjoining Territories, showing the Gulch or Placer Diggings actually worked and Districts where Quartz (Gold

and Silver) lodes have been discovered to Jan. 1st, 1865, drawn by W. W. De Lacy for the use of the first Legislature of Montana' (Censoul, 1865).

On the 17th of July the whole party left the little frontier village of Eugene "city" amid the cheers of the people. For two pleasant days our route lay among the outlying settlements of the Willamette, among rounded knolls, or as they are called here "buttes,"* with neat little primitive farms at the base of rocky bluffs, where rough voices hailed us cheerily.

The country was well watered and well wooded, and many were the roaring mountain-creeks we had to cross or swim. Our daily routine was much the same. At daybreak the bugle sounded; then reveillé; all commenced packing up, and the cooks prepared our modest breakfast, of which the inevitable pork and beans formed the staple: the horses were then driven up, every man lassoing his own and saddling it. Then the mules were packed with the usual ejaculations in Spanish and English. Our march was rarely prolonged beyond midday, often camping much earlier, to allow of the overloaded train resting, for the grass, or for convenient camping-places. We spent the rest of the day reconnoitring the neighbourhood for plants, fishing in the mountain-streams, hunting deer through the long, dank, wooded dells, or sleeping under a bush, each as his own individual penchant inclined him, the bugle calling us back to camp for supper; after which each man rolled himself in his blanket under his own particular tree, until the cheery bugle again woke us at daybreak, to make our toilet in those grey misty summer mornings by the banks of some nameless stream, and then to resume our march. The road (such as it was) became worse and worse. We rode through timber and in sight of the middle fork of the Willamette, gliding along between wooded banks of pine and cedar and summer green-leaved maple.

On the 19th we travelled through cañons and thick woods, over many small creeks, and by the banks of the river, with no cultivation. Next day our route lay through dense timber, and after passing a party of Indians making the trail we had to drive our horses before us, scrambling over fallen trees and among rocks up steep inclines, until we came to a point which was named "Point Look-out," where we had great difficulty to get our horses over. Here we encamped, driving our horses across the river. The next eight miles we marched through wooded

* A useful French Canadian voyageur's term to express a rounded elevation too low for a mountain, but too high to be called a hill. This distinction is, however, not strictly adhered to: *e. g.*, Shasta Butte (more than 14,000 feet).

river-bottoms. Swam the river again; climbed a steep mountain trail (for we were now entering among the hills of the Cascade Mountains) and emerged into a beautiful prairie valley, shut in by mountains, but covered with grass, a good creek flowing through it, and with shady woods on the border, so that one might fancy oneself in the "Happy Valley" of Rasselas. The next two days the country was similar, and we encamped (after travelling five miles) on a little prairie.

On the 24th of July the trail lay through woods of fine timber, white and red cedar, and we now noticed for the first time the stately sugar-pine (*Pinus Lambertianus*), the sweet exudations of which are one of the hunter's cathartics. A rhododendron and a honeysuckle (*Lonicera Douglasii*) added variety to the sombre woods, hitherto diversified only by an undergrowth of berry-bushes—the bright salmon-berry flowers, the more modest thimble-berry (*Rubus divaricatus*), and the waxy sal-al (*Gualtheria*), forming an undergrowth like a carpet throughout the woods, and a sure sign of poor stony ground. The stately alder (*Alnus oregonus*), with its dark-green leaves, affected moist ground everywhere, and the hemlock (*Abies Bridgesii*), most graceful of all the north-western conifers, began to disappear from the woods, the silver fir (*Picea grandis*) supplying its place. Now and then we would break through thickets of the mountain laurel (*Ceanothus velutinus*), sending an almost overpowering fragrance from its glistening leaves as we trampled it down under our horses' feet. Amid these pleasant scenes we had a day of disasters; two mules with their loads had rolled over a precipice and were dashed to pieces, and another, after rolling *end over end* (after the manner of mules), had survived and brought its load into camp. Part of the loads were recovered, but a side of bacon up a Douglas pine-tree will remain as a monument of the passing of the first expedition through these mountains. Some emigrants had attempted it in 1853, and we could yet see remains of their disastrous trip, in which some of them died of starvation.

Our track had hitherto been always in a general south-east direction, and to-day it lay by the banks of the middle fork—seeing little but woods and wooded hills of the pass. We saw signs of bears, wolves, and panthers. Deer were seen, and trout abundant. The rocks were all volcanic (trap), and the soil sandy, and, with the exception of the wooded river-bottoms, little fit for cultivation.

We travelled 14 miles before camping, over a fair track with a creek some part of the way, and latterly leading over a country with many steep places, where we had to ride by an almost perpendicular path. In one of these wooded gulches we were met by

a number of Cyuse Indians and a white man, all dressed in most gorgeous array of buckskin and beads, crossing for horses to the Willamette country. The scenery was here very fine. On every side bold wooded mountains, with the headwaters of the Willamette sparkling between the trees, and the snow of Diamond Peak in the distance. On the 28th, after every preparation being made, we commenced the passage of the Cascades into Eastern Oregon. The ascent was comparatively easy, crossing over many mountain-creeks, through woods, where I saw many trees of a species of yew (*Taxus brevifolia*), until the elevation began to be perceptible in the flora,—plants which were long ago in fruit in the valley were here in partial flower, until, as we gained the summit, they were in full bloom. Thickets of rhododendrons with their huge bunches of pink flowers stood out in fine contrast to the drifts of snow, giving one a faint idea of the splendid rhododendron thickets in Sikkim Himalaya, so graphically portrayed by Dr. Joseph Hooker. Occasionally a magnificent species of mountain lily would bloom by the side of some beautiful saxifrage, and the shrubbery of the *Ceanothus* would add fragrance to the mountain air. The scene from the summit of the pass (4441 feet*) was grand in the extreme. The bold crags of the Diamond Peak with its old crater, and the “Three Sisters” appeared to the north, and on the left, away to the south, the tops of Scott’s Peak and Mount Williamson; while the wooded valleys and lesser heights of the Cascade Range lay below, and off to the east the long slope of flat, wooded country, with the peaks of the “Three Brothers,” the only break in the monotony of the view. Drifts of snow lay in shady places, and green grassy spots formed halting-places by the side of mountain-streams. Now and then a beautiful mountain-lake, unsuspected before, lay glistening in all its quiet beauty in some unbroken valley. As we began the descent a marked change was apparent in the country. Instead of moist woods, our route lay by an easy descent through groves of a pine thickly scattered over that country (*P. contortus*), encumbered with no undergrowth, and the soil a mass of volcanic ashes and pumice-stone. At 2 P.M. we were right glad, after a weary ride of 26 miles, to reach the headwaters of the Deschutes or Falls River (lat. 43° 27' 22" N.). Deschutes River arises by several forks, some of which take their source in the marshes, another in a lake, which we named “Summit Lake” (we had seen it on the right hand in descending) that communicates by a small creek with another 16 miles in length, lower down (named “Crescent Lake”); and this

* This was from the observations of Mr. Byron Pengra, late Surveyor-General, Oregon, and may, I think, be relied on.

is again connected with a third among the mountains, styled, in honour of one of the party, "Lake Oddel." Our camp here was 1200 feet below the summit.

Hérons, cranes, and grouse were abundant near the river, but otherwise few birds were seen in this solitary region.

On the 29th of July we began to direct our course in an E.S.E. direction over a level desert flat, with a soil composed of volcanic ashes, and thinly scattered with a forest of *Pinus contortus*, a scrubby-looking tree at best, abounding in resin. To the east and north-east lay a long stretch of flat land, probably 90 miles' breadth, of a similar character to this, but which we found to be impracticable to traverse on account of the almost entire want of water in it. The creeks flowing from the Cascades being lost in "sinks" before going far into this desert track. The "Three Brothers" are the only breaks in this nearly level landscape in that direction, and the snow peaks of the Cascades gleaming through the trees diversify the view to the right, and now and then a cool breeze tempers the hot summer's day as we slowly in long file traverse this wild track. After a march of 11 miles we halted on a branch of the Deschutes River, where we found a tolerably good tract of meadow-land in the immediate vicinity of the river. Deer were plentiful, and the beautiful little humming-birds flitted about among the few flowers which the invigorating moisture allowed to spring up here and there among the long swampy grasses. On Sunday, the 30th July, the track was much as before, only more hilly and varied.

Hitherto, though a sharp look-out had been kept, we had seen no Shoshones Indians, but this evening our scouts came in with very long faces, describing the great moccasin-tracks crossing our trail after we had come into camp, and as every one knows that this was the "sign" of that tribe, we slept with only one eye shut. It was only on our arrival at Fort Klamath that we learned from the Indians there that we had been dogged by three lodges of Snakes the whole of our journey, seeking an opportunity to "stampede" our horses or capture an odd scalp or two, when it could be done without the disagreeable accompaniment of running their heads against a leaden bullet. Once as we crossed Fremont, the "Pathfinders'" trail, the tracks of mocassins and "barefooted" (unshod) horses, with camp-fires not extinguished, began seriously to alarm us. However, we afterwards found that it was the Superintendent of Indian affairs for Oregon on his way with his band of Cyuse scouts to try and make a treaty of peace with Pah-ni-ne.

On the 2nd of August, after travelling 10 miles, we came to a straggling creek with a great extent of rich grasses by its borders,

but the soil very poor and sandy. We named this stream, the only one for several miles, "Rifle Creek." Scott's Peak was here directly abreast of us, and is a truncated cone of a peculiar form. On the morning of the 3rd of August we were early astir, and, after a march of 7 miles, turned down again to a beautiful prairie near the Klamath Marsh, where the party lay over for several days, and the animals revelled in a paradise of clover. We could see Indians in canoes gathering the pods of the yellow water-lily on the marsh, and tracks of grizzly bear did not make our woodland botanizing anything the pleasanter. Here I bade good bye to my gallant *compagnons de voyage*, from whom I had received so many kindnesses, and, accompanied by Lieut. McCall and an escort of six troopers, rode over the ridge to the westward, to a fort recently established in Klamath Basin, and supposed to be distant between 15 and 20 miles. We had a pleasant ride over a low ridge—a spur of the Cascades—through a fine grove of yellow pine (*P. ponderosus*), where we shot a skulking coyote wolf (*Canis latrans*, Sag.), and then, descending into a valley where Indian sign was plentiful, until from an eminence the lovely prairie of Klamath Basin—shut in by snowy mountains with cold rivers meandering through, and studded with groves of trees, like wooded islands in a sea of grass—burst upon our astonished view, so long accustomed to the arid tract we had been passing over. We crossed the "Fort Creek," a stream of icy-cold water (which springs out of the ground in one torrent), our horses almost hidden amidst the luxuriant herbage, and then through a mile or two of country which it required recollection of where we were not to suppose some old English park; we arrived at the fort, covered with dust and most unpresentable figures. The valley of Klamath Basin is excellent soil, but cold springs come down from the mountains and render the subsoil so cold that cattle cannot subsist here in the winter, and garden produce, with the exception of beets and turnips, does not come to any size. Down by the borders of Klamath Lake and Sprague's River the snow lies only a short time, and there the Indians winter their stock.

The Snake or Lewis Fork of the Columbia River is navigated during the few weeks of high water by a steamer as high up as Lewiston (so named from the celebrated explorer), but from recent explorations it is found that the valley is entirely different from the mouth of the Boisé down to Old Ferry from what it is below. There is said to be no Snake Valley above Boisé and Owyhee rivers, the Snake, winding its way around low alkaline hills which bear only sagebrush; and there being no grassy bottoms or islands worth

speaking of, only clayey banks of almost dazzling whiteness, the district offers no inducements to settlement. The river is from 200 to 400 yards wide, deep at its mouth, and free from "ruffles;" the current averaging the strength of the Columbia between the Dallas and the Cascades. The Owyhee and Boisé rivers, which debouche into the Snake within a short distance of each other, sensibly increase the volume of water. The limits of this paper being our own personal explorations, it would be out of place to attempt any laboured geographical description of the country outside our track, however little known or (what is worse) erroneously described, yet I cannot leave the Snake River without mentioning the magnificent waterfall discovered on the upper reaches of it. We have received from one of the discoverers a trustworthy account of these grand falls. They were discovered by a detachment of troops scouting in the valley of the river in 1863. The entire volume of the Snake pours over a sheer precipice of 198 feet, 38 feet higher than Niagara. The locality of this immense waterfall is near the point hitherto designated as the Great Shoshow, or Salmon Falls, of that river, but they have always been enveloped in mystery. For hundreds of miles across that great plain, Snake River flows through a cañon with vertical walls. The route crosses from point to point of the bends, only approaching close to the river where there is a chance to descend to the water. From these facts few, if any, of the many adventurers that have "crossed the plains" ever looked upon the Great Falls. The discoverers report, besides the main cataract, many others of less height, varying from 20 to 50 feet each, near by.

The Boisé basin comprises the principal mines which have been discovered in and about the middle portion of Idaho territory. It lies in near lat. 43° N., and is surrounded by very high mountains, from which waters flow into the tributaries of the Snake, the Colorado, and the Missouri. Jefferson's Fork being the principal tributary of the Missouri, Green River of the Colorado, and Snake River of the Columbia. On this stream but little mining has been done, the gold being generally so fine that little exertion has been made to save it: there being good mines near at hand in the basin, and wages rating high. This, together with the fact that sufficient water can only be had about three months in the year, has impeded the progress of mining. Boisé basin may be estimated as being about 25 miles long and 10 miles wide. The gold is not found in strata of earth or gravel, but in leads, many places being marvellously rich; others (as is too often the case with gold-diggings generally) not paying the expense of working. This is

true of all gold mines, that while one man is making a fortune, fifty are ruined: indeed, out of the hundreds of gold miners whom I have known, I cannot recollect ten who have earned more by gold mining than they would have done by any other quieter and less laborious employment in the same country. In this basin there are four villages:—Idaho City, the capital, is the largest; Pioneer City, the second; Placerville, third; and Centreville, fourth. Pioneer City is better known as "Fort Hog'em." Granitic rock forms the basis of these mountains, and is what the miners call the "bed-rock." By sinking down, deposits of washed boulders have been found to a depth of 90 feet. The hills are composed of syenite or granite, blue, whitish, and grey, with occasional eruptions of basalt, serpentine and trap, with strata of metamorphosed clay-slates, and when felspar prevails the soil is generally loose and rich in gold. The quartz veins, running N.N.W. and S.S.E., vary in width, and prove rich on the surface, evidently showing that the gold in the creek, &c., has been disintegrated from them. In many of the ledges, pyrites of iron, antimony, copper, galena, sulphur, arsenic and bismuth occur. Some of these metals are plentiful, but are obnoxious to the quartz millmen, as it is impossible to work the gold-bearing rock sufficiently fine for successful amalgamation, when having to contend with these baser metals. The valley of Boisé River has two benches or raised terraces. The lower shows marks of inundation, and is in places moderately fertile. The upper is dry sandy soil, with no available ground to cultivate at all. The valley is only calculated to raise vegetables enough to supply the mining camps around. It will never yield a large quantity of hay or grain. Last winter (1864-5) the thermometer sank many degrees below zero. The rivers are belted with cotton-wood trees, but not heavily. The confluence of the Boisé with the Snake River is about 40 miles below Boisé "City."

The PRESIDENT informed the meeting that Mr. Brown, who had brought Mr. Hines' paper to England, and enlarged it by remarks of his own, was a most able botanist, and had travelled for several years in the countries of western North America. He had himself witnessed Mount Hood in a state of activity. With regard to the subject of the second Paper, the meeting would recollect that some years ago, Colonel Fremont traversed the Cascade chain, in his explorations of the then almost unknown Pacific regions of North America. The route taken by Mr. Brown, as described in the paper, was, however, quite a new one, and the ground traversed different from that described by Fremont. The paper was a long one, and composed of several distinct narratives relating to the country between Oregon and the territory of Idaho, but the remainder of it could not be read that evening.

Mr. BROWN said that the Cascade range of mountains traversed the British possessions, Washington Territory and Oregon, from north to south, and were a continuation of the Sierra Nevada of California. Farther to the south, the

ranges were connected by the spurs of the Siskiyou. The range was more important even than the Rocky Mountains, as far as concerned the physical geography of North America, because, while the climates on the immediate eastern and western sides of the Rocky Mountains were very similar, and the plants and animals almost identical, the plants, animals, and climate on the sides of the Cascade Mountains were very dissimilar. The soils were also totally different in character on the two sides of the range. The soil on the western side was rich and fertile, and a portion of it was thickly wooded. Many districts were cultivated, and in fact almost the whole population of Oregon, comprising 50,000 or 60,000 people, were found in the valleys of the west; whereas, on the eastern side the soil was poor and the country arid, and there was no cultivation except in such valleys as that of Deschutes, which was well watered. The cause of the western side of the range being more fertile than the eastern, was that the mountains caught the warm breezes from the Pacific, and precipitated the moisture over that region. The Cascade Mountains had all been more or less active volcanoes, and some of them were active to this day. He had occasion in exploring the range to visit the old craters, and he found that several of them had deep lakes like the Gemunder Maar in the Eifel, the Pulvermaar, the Murfel der Maar, &c. Mount Hood was an active volcano. In October, 1865, there was a severe earthquake in California, which was felt all over the west coast. He had occasion to make, with the assistance of a friend, some observations upon this mountain near the Columbia River. He arrived there in October, just after the earthquake, and though he himself did not see any eruption in which fire was visible, yet his friend observed some flames. On the day after their arrival they saw smoke issuing from the mountain in large volumes, and in the afternoon of the same day there emerged large volumes of steam, occasionally mixed with black smoke. The next day the emissions consisted almost entirely of steam. This steam formed into clouds, and drifted away to the horizon. The day following that was wet, probably in consequence of the steam which had escaped from the volcano. During the following winter, the snow covered the whole mountain, and Mr. Hines' ascent was made after that. But in the summer of 1866, black smoke was again seen issuing from Mount Hood. He had just received a letter from the North-west Coast, stating that on a very clear day smoke had been seen recently coming out of the mountain. Mount Rainier was seen in eruption in 1842; and Mount St. Helens in 1842 sent out showers of ashes, and General Fremont mentioned that he saw some of the ashes. In reference to Mount Baker, that mountain could be seen very well from the town of Victoria, Vancouver Island, and the colonists viewed it with very great pride. Its height had not been exactly ascertained, but it was supposed to be between 10,000 and 11,000 feet. He made an attempt to ascend it in August, 1866; but, after going for five days into the interior of the country, the Indians would not allow his party to proceed; but some of the party afterwards succeeded in reaching nearly to the summit, and saw streams of lava. In 1863 flames were seen coming out of Mount Baker; and he was told by Sir James Douglas that in former years he had seen flames issuing from the summit. He (Mr. Brown) was told by trustworthy observers that, in the summer he ascended, flames were seen at night, but the eruption was not of a very decided character. He had seen lava and pumice-stone in the adjacent stream.

Mr. DALLAS, late Governor of Prince Rupert's Land, said he agreed with the general description of the country given by Mr. Brown. He had, however, been rather amused by the apprehensions entertained by the American officer of an attack from Indians, and by the commanding officer warning Mr. Brown, on entering the country, that he would have need of ten scalps. He (Mr. Dallas) had traversed a large portion of the country, and

travelled amongst the most hostile of the Indians, namely, the Blackfeet and the Sioux, without any fear. He wished to call attention to the remarkable fact that all over North America, wherever the British rule prevailed, there had been scarcely any instance of disturbance or collision with the Indian tribes. He did not think that could be said of any other part of the world where we had come into contact with the natives of the country; he could instance the Cape of Good Hope and New Zealand. He attributed this exceptional result in the case of the North American Indians to the tact and management of the early pioneers who inaugurated the system, which had been always maintained by the Hudson's Bay Company, namely, under all circumstances to maintain friendly relations with the Indians. Even in cases where aggressions and raids had been made by them, though we had always punished them, yet we had done so in accordance with their own ideas and customs, and had generally been successful in carrying their convictions with us. This fact of the immunity of British subjects among the tribes of the Indians was remarkable, and spoke very much in favour of the management of those who have had the rule of the country; while, as regarded Americans, it had never been safe for anyone to travel the country as an American.

SIR EDWARD BELCHER said he must congratulate the Society on receiving a paper from persons who had been brave enough to ascend the snowy peaks of the Cascade Mountains; but he should have felt much better satisfied if the paper had given the data upon which the altitude of Mount Hood had been deduced. Passing up and down the Columbia River he had seen these mountains, but, as far as his own estimate went, he should consider that Mount St. Elias, which he had also seen, was infinitely higher than the mountains of the region described. There could be no question about that.* St. Elias was the father of the icebergs of that icy sea. The ice had been seen slipping down the mountain, and actually calving its bergs into the sea. At the time he passed Mount Hood it did not strike him as a very lofty mountain. He estimated its altitude from Fort Vancouver, having no second position which would give a proper basis for determining the height; but one curious fact was that Mount Hood was not seen from the sea. It was not so high as to allow of its being seen over the outer ridge of mountains, and therefore he could not imagine that it was of the altitude which had been stated. He could most clearly bear out all that Governor Dallas had stated with regard to the safety of British subjects among the Indians. He (Sir E. Belcher) had mentioned, in a work which he had published, the case of a hunter named McLeod, who, with no company but his wife, travelled right through the mountains to the Indian settlements and back again, without any harm happening to them. Some Americans who followed and attempted the same route, not being British subjects, were stopped, and, he believed, murdered by the Indians. Signs of former volcanic action had long ago been observed near the mouth of the Columbia River, in the great quantities of pumice-stone found there, and as far as the sandy beaches extended. The River Willamette was the centre of the district in which the Governor of Vancouver Island had allowed a party of Americans to establish themselves in 1838 or 1839. It was a very rich country. He had no doubt that the Western coast, wherever the sea-breezes reached, would prove well adapted for cultivation. He very much doubted that any of the land on the Eastern side would be productive. For instance, on the banks of the Sacramento, for a distance of upwards of 96 miles as the crow flies, although the banks were alluvial and there was a great depth of soil, nothing would grow except the coarsest grasses.

MR. CASELLA stated that the deduction made with regard to the altitude of

* No decided determination of the height of Mount St. Elias has been arrived at: whence then the assertion that Mount Hood is higher?—E. B.

Mount Hood, by the author of the paper, was correct, if the data were correct. It was stated that on the summit of Mount Hood the temperature of boiling water was 180°. That would be equal to about 16 barometrical inches, each inch being equal to 1000 feet, which would give an elevation of about 17,500 feet. If the instruments used were correct, there could be no doubt that the elevation would be as near as possible what had been related.

Sir EDWARD BELCHER replied that, with a set of instruments specially adapted for observation of the boiling-point, it was found that the calculations were in some cases as much as 2000 feet in excess, as compared with trigonometrical survey.

Mr. CASELLA said that there might be variations and deviations; but the thermometer as an instrument for measuring altitudes stood inferior only to the barometer itself, besides the advantage of being so much more portable.

Mr. W. L. BOOKER (Her Majesty's Consul at San Francisco) said that about fifteen or sixteen years ago California was the only part from which the gold of North America was exported. At that time the quantity of gold received at San Francisco probably amounted to twelve or thirteen million pounds sterling. California did not yield nearly so large an amount as it did formerly; but the enormous amount of territory opened up by gold miners and others afforded a larger total yield of gold than was produced in California ten years ago. He had no hesitation in affirming that the quantity of gold yielded on the western slope of the Rocky Mountains was more now than it was seven or even ten years ago. A great deal more was absorbed in the country itself; but the exports from San Francisco were about as large as they ever were. From its geographical position, San Francisco must always be the port for the whole of the western part of North America.

The PRESIDENT asked whether the region which was so particularly auriferous in the first instance had not been pretty well exhausted of gold.

Mr. BOOKER replied that the Placer mines were all nearly exhausted. The gold was now got in California from quartz mines and from the mountains by washing them down by hydraulic pressure, and although the yield was probably very small to the ton of earth, still by the use of a huge pressure of water thousands of tons could be washed with the same facility as 50 or 100 tons formerly. He could not speak of the gold yield of the Cascade range of mountains; but in 1859 silver was discovered in the Nevada territory. He believed that about 2,400,000 pounds sterling was the average produce of the Territory (now State). There was an intermixture of gold with this, and the metal was worth on an average about 20s. or 24s. the oz. From Idaho, Washington Territory, and British Columbia, between three and four million pounds sterling of gold and silver, but chiefly gold, were annually brought down. Oregon had always been a very good agricultural district; but not being so thickly populated as California, the produce was not so large. Twelve years ago California was an importer of grain; but this year they had nearly a million quarters of wheat for export over and above the wants of the country. The oats produced in Oregon were unquestionably the finest in the world. He had seen oats weighing 52 lbs. to the bushel brought from Oregon by the ship-load. The barley was not so good either in Oregon, California, or Washington Territory. It was what would be termed in England "grinding barley," although it was used for malting. Gold had been discovered on both sides of the Rocky Mountains: it came to San Francisco from the west slope, and not from the eastern slope at all. Montana, Washington, Oregon, Idaho, down as far as the Mexican frontier, were all more or less gold-producing. In the southern part of the State of California, 150 miles south of San Francisco, almost all agriculture ceases. That was a grazing country, but not so good as had been supposed, owing to its being subject to great droughts: three or four years ago more than half the cattle and a third of the

sheep were destroyed by this cause. The Sacramento Valley, and to the south of San Francisco, a district pronounced many years ago by Governor Douglas as unfit for growing grain, were very fertile, and the latter had proved of late years to be the very best grain-growing country. He (Mr. Booker) had seen lands, not more than 60 miles south of San Francisco, which had produced 80 bushels of wheat and 120 bushels of barley and oats to the acre. A portion of the country consisted of steppes. The district near the sea produced the largest returns, and the land gradually became less fertile the higher it was, until at last it was fit only for grazing land. The neighbourhood of the geysers was the finest agricultural country in the world, consisting of narrow valleys, with rivers or creeks running through them. These valleys afforded magnificent views to those who were in search of scenery, and plenteous crops to those who were in search of the rewards of husbandry. Last spring he ascended Mount St. Helens, near the Geysers. The height was about 4600 feet, and the ascent was very easy by means of a pathway through the brushwood. The top of the hill was a region of stunted pines, not one of which exceeded 10 feet in height, and bearing large cones. The top of the hill afforded a view which he did not think could be easily surpassed.

ADDITIONAL NOTICE.

(Printed by order of Council.)

On the Sources and Course of the Lycus and other Rivers in Kurdistan.

By J. E. TAYLOR, Esq., Her Majesty's Consul at Diarbekr.*

(Communicated by Captain FELIX JONES.)

MY DEAR CAPTAIN JONES,—

Feb. 2, 1867.

I send you a rough map of my last journey and routes from Erzeroum to Kára Hissar round to Arab-Kir; thence to Khozat and through the Deyrsím to Kamach and Erzingán; from there again, but by another line, through the Deyrsím to Khozát; thence to Mazgerd or Hormuzgerd on to Peyrtek and Kharpút.

The interest of this route consists in my having satisfactorily traced the Kalkyt, Degirmen, or Kara Sú (the Lycus), from its source down to the point where it is generally known near Koinloo Hissar, as also its principal tributary the Koát or Kara Hissar Sú. The real source and early course of the Kizzil Irmák or Halys has also been visited and fixed. It rises at the foot of the high centre peak of the Kizzil-dagh; hence its name. Subsequently I followed the Mezoor Su and the river of Tchimishgezék, both of which are one with the Chigneyr Su, and they are now for the first time laid down with something like exactitude. Independent of these new notices, I think I have supplied a tolerably correct sketch of a great part of the Deyrsím Dagħ, a range of huge mountains only to be penetrated at three points from the north, viz.—by the narrow passes of the Ziáret, Harámí, and Merján Bogházi. The first I followed on my way to

* The details of Mr. Taylor's discoveries, with his map, will be published in the Journal vol. xxxvii.

Kamach, and the last on my return from Erzingán to Khozát, Mazgerd, and Kharpút. The old town of Saddak, which lies near the head of the Lycus, is interesting, and has not yet been visited or described; nor was the site of Pompey's Nicopolis finally determined before. But a Roman milestone which I found near it (the modern Purk) at Ak-Shéhr, fully settles that point as well as identifies the rock and old ruins of Kara Hissar as the last place of refuge of Mithridates when flying from Pompey previous to escape into Colchis. It is certainly either that place or the old Dasteira. (See Strabo, Book xii. cap. 3.)

The above are only a few of the more salient matters of interest which present themselves in a journal too copious for me to arrange at present. Nor can I say anything here on the extraordinary Kizzil-bash race, their customs, religion, and language, as these topics require more time than I can spare from official routine. You will observe that the country covered by my map is that part (from $38^{\circ} 40'$ N. lat. and $39^{\circ} 40' 30''$ E. long.) left bare in Kiepert's last map of those parts. It is right to note that my predecessor, Sir R. Dalzell, performed part of the route between Kamach and Halvoree Vank before me; but I do not think he has preserved any data for laying down his travels.

One word more as to the map. According to my reckoning and bearings, Erzingán is no less than 21 miles north of the position ascribed to it by Kiepert; this in itself will change the whole course of the Kara Sú or Erzeroum branch of the Euphrates. But, after reading what I now offer as to the fixed data which serve as bases to my work and the matter of it, with the subsequent issue, I think you will be disposed to say that I am right and Kiepert wrong. In the first place, Erzingán has never been astronomically fixed; Erzeroum, Kara Hissar, Arab-Kír, and Kharpút have; and those points were my guides. My work was planned every evening from bearings and angles taken at every turn of the road; the pace of my horse had been ascertained from twenty measured and timed trials in the Erzeroum plain, and during every week of my journey. The pace of laden mules—which rarely varies—was also regularly noted between stage and stage. In this manner my observations were only 2 miles out on arriving at Kara Hissar, 3 miles at Arab-Kír, and 3 miles at Kharpút; on all occasions that error was east of the fixed positions. The work was done in three portions, with a fresh starting-point for each.

1st. From Erzeroum to Kara Hissar.

2nd. From Kara Hissar to Arab-Kír.

3rd. From Arab-Kír to Kharpút.

The above portions are embodied in the rough map now sent to you, as I wish to ensure my claim to priority of discovery, which might fail were I to delay notice until the map I have in hand is completed. You will doubtless accept the charge of the papers with the intentions which prompt me to consign them to you. I am busy with a memoir to accompany the work at a future date; unavoidable occupations, however, prevent steady application to it, but I still hope to have it ready in a couple of months.

J. G. TAYLOR.

PROCEEDINGS
OF
THE ROYAL GEOGRAPHICAL SOCIETY.

[ISSUED JUNE 14TH, 1867.]

SESSION 1866-67

Seventh Meeting, 25th February, 1867.

SIR RODERICK I. MURCHISON, BART., K.C.B., PRESIDENT,
in the Chair.

PRESENTATIONS.—*The Rev. Pierce Butler; Alexander F. Low, Esq.; Henri L. Bischoffsheim, Esq.*

ELECTIONS.—*Henri Louis Bischoffsheim, Esq.; Dr. D. Brandis, F.L.S.; T. W. Forsyth, Esq., C.B. (Bengal Civil Service); Jones Lamprey, Esq., M.D. (67th Regt.); Rev. Samuel Martin Mayhew; Colonel the Right Hon. Lord Seaton; Edward Thornton, Esq., C.B.*

ACCESSIONS TO THE LIBRARY SINCE THE LAST MEETING. *Donations.*—*'North American Rock-writing and other Aboriginal Modes of Recording and Transmitting Thought.'* By Thomas Ewbank. Donor, A. Petrie, Esq. F.R.G.S. *'Reisen durch Süd Amerika.'* Donor and Author, J. J. von Tschudi. *'Vallesiae et Alpium Descriptio.'* By Josiae Limleri. Donor, S. M. Drach, Esq., F.R.G.S. *'Guide to Australia.'* 1863. Donor and Author, S. W. Silver, Esq., F.R.G.S. *'Night Records of a Journey to Jesso, by a Japanese Traveller in 1861.'* 3 vols. *'History of Chinese Geography.'* 32 vols. *'The Yellow River.'* 7 vols. *'Chinese Dictionaries,' &c.* 5 vols. *'Japanese Illustrations of the People of Jesso,' &c.* Photographs of Chinese Scenery, People, &c. Map of China. Road Maps, &c. All by Dr. J. Lamprey, 67th Regt. 17 Vols. and Pamphlets from Christiania, of Reports of Learned Societies, Statistics, &c. Collection of Original Drawings of a Journey in Australia. By Dr. F. Mueller. Presented by Sir R. Murchison. *Elementary Treatise on 'Quartz and Opal,'* including their Varieties. Donor and Author, George William

Traille, F.G.S.E. Report on the Irrigation of Eastern Spain. Donor and Author, Clements R. Markham, F.S.A.

ACCESSIONS TO MAP-ROOM SINCE THE LAST MEETING. — One sheet of Topographical Survey of Sweden: Nyköpings Lan. Presented by Major-General J. A. Hazelius, Chief of the Royal Topographical Corps of Sweden. Natal: a Map of the Zulu and Adjacent Country. Presented by Capt. Walmsley, F.R.G.S. Map of the Republic of Paraguay and Provinces of Corrientes and Entre Rios. Presented by T. I. Hutchinson, F.R.G.S., British Consul at Rosario. 3 sheets of the Geological Map of Sweden. Presented by Professor A. Erdmann, Chief of Geological Survey of Sweden. France: Carte Hydrologique du Département de la Seine. Presented by M. Delesse, Professor of Geology and Engineer to School of Mines, Paris. Switzerland: 9 sheets of Dufour's Atlas, corrected up to 1866. Presented by the Federal Government.

The following Papers were read:—

1. *An Exploration of the River Aquiry, an Affluent of the Purus.* By W. CHANDLESS, Esq., M.A., Gold Medallist of the Royal Geographical Society.

THE Author began by recapitulating the chief points of interest in his narrative of the Exploration of the Purus in 1864-5, which was read last Session before the Society, whilst he was on his second journey (in 1865-6) up the river to examine its chief affluent the Aquiry. For the first fifty miles the Purus is a fine broad river, in parts broad and straight enough to give a fair water-horizon. Above this begin the numerous abrupt windings that add so much to its length. This unexpected tortuousness has thrown wrong most calculations about the Purus made from information obtained on the Amazons; thus Count de Castelnau estimates that the mouth of a certain affluent of the river must be at least as far south as 12° , that is more than 8 deg. of latitude from the Amazons; but it is really in latitude $7^{\circ} 48'$, or only 4 deg. south of the main river. There are very few settlers on the Purus; the one furthest from its mouth—about 250 miles—being an intelligent enterprising man who has begun to make a plantation of india-rubber trees, but he complained that the macaws bite off and drop down the unripe seeds of all the trees in the neighbourhood, so that it was difficult to get good seeds. The Indian tribes of the river are, in ascending; first, the Múras, who thinly people its banks for 250 or 300 miles; second, the Puru-purus, or Pammarys, essentially a water-side tribe, unwarlike and good-humoured; third, the Hypurinás, a grave

warrior-tribe, but whose wars are but village wars among themselves—they extend along the river for nearly 300 miles (not counting the local bends), the lower half have to some extent dealings with white men, but the rest are wild. After the Hypurinás there is a break of 100 miles or more where Indians are rarely seen, and beyond that a tribe is met with far more civilised than any below—the Manentenerys; they plant cotton, spin and weave it; when first met with they showed no fear, like other Indians, but met the traveller half-way; they seemed to have had some communication overland with the Catholic missionaries at Sarayacu on the Ucayali: they are fairly supplied with iron implements, which they seem to obtain from the Peruvians of the Ucayali, not directly, but through the medium of other Indians. Mr. Chandless heard of a portage here from the Purus to the Ucayali, over which a canoe could be dragged in two days, and, when embarked on the Ucayali, arrive at Sarayacu in ten days; but he was unable to verify the fact. The Manentenerys were industrious and well-clad, and their women seemed to be well-clad. Beyond the Manentenerys came the Canamarys, which had never before been reached by travellers from the Amazons. They were honest and well-mannered, and live on good terms with their neighbours. Beyond the villages of this tribe there was again a long gap destitute of inhabitants, and Mr. Chandless then met with Indians, near the sources of the main river, who had never had any intercourse, even indirectly, with civilised men; they were ignorant of the use of iron, using stone implements, specimens of which he exhibited to the meeting.

The Purus for nearly its whole length flows through an alluvial plain with occasional clay cliffs, similar to those observed throughout the line of the main Amazons. The Aquiry flows through what is called in Portuguese *terra firme*, but the country, like that of the Purus and Upper Amazons, is densely covered with forest. On the Aquiry Mr. Chandless picked up some fossil bones which, on being shown to Professor Agassiz, were pronounced by him to belong to the *Mososaurus*. The animals seen on the banks of the Aquiry were very tame. Capybaras were especially numerous, resembling flocks of sheep on the banks. On the sand-banks of the Purus the green ibis and the peacock-heron used to run along a few yards ahead of the canoe. In one place, Mr. Chandless witnessed the unusual sight of numerous flocks of curassow-birds settled on the ground, attracted by fruit growing near the edge of the water. The lower part of the Aquiry was inhabited by Hypurinás; higher up succeeded the Capechenes tribe, who have no canoes, but merely a few rafts of arrow-grass. The first 300 miles of the Aquiry Mr. Chandless found no difficulty

in navigating, even at the lowest stage of water. He considered it to be perfectly navigable for steamers up to the parallel of 11° s. At some future time it may become a valuable means of communication with the province of Caravaya in Southern Peru—the more so as thus far it comes straight as if from the Madre de Dios; still it was not of a size to give him much hope of its being that unapproachable river. After the parallel of 11° the Aquiry bends from the west and becomes wider and shallower, so that the party had to drag the canoes perpetually over the obstacles. At last canoe-travelling was completely stopped by a network of stranded timber, and Mr. Chandless had to leave behind most of his party with the larger canoe, and continue the journey in a small boat (*montaria*). He was here a little too early, for the dry season had not yet broken up and given depth to the upper course of the river. At length he found it useless longer to continue the laborious task, and turned to descend.

From a point a little above where the Aquiry bends from its easterly to a northerly course, lat. 11° s., Mr. Chandless started inland on foot, striking due south and hoping to reach some other river belonging to the Madre de Dios basin. For the first three or four miles inland the wood was tolerably clear, but beyond that distance almost impenetrable, except where the party cut a path. At the end of a week he was compelled to return for want of provisions. At four or five miles from the bank of the Aquiry he crossed a low ridge, and beyond this came to a succession of small streams, all with a general direction of east. Mr. Chandless concluded by expressing his opinion that the Madre de Dios falls into the Beni, perhaps between 11° and $11^{\circ} 30'$ s. lat.

The paper will be published entire, with the Author's map of the Aquiry, in the Journal, vol. xxxvi.

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2. *Journal of an Expedition to Explore the Courses of the Rivers San Gavan and Ayapata, in the Peruvian province of Caravaya.* By DON ANTONIO RAIMONDY, Honorary Corresponding Member of the Royal Geographical Society.

DON ANTONIO RAIMONDY, our Peruvian Honorary Corresponding Member, who is already well known to South American geographers as the author of a valuable work on the Amazonian province of Loreto, has now communicated to the Society a most interesting paper, containing the results of his exploration of the rivers San Gavan and Ayapata, in the Peruvian province of

Caravaya. The maps of this region are so incorrect as to be quite useless, and it was the desire to fix the positions of these two rivers, from their sources in the Cordillera to their junction with the Ynambari, which led Señor Raimondy to undertake this adventurous journey in August, 1864.

The province of Caravaya is traversed from W.N.W. to E.S.E. by the great cordillera of the Eastern Andes, and a narrow strip of territory along its eastern frontier is occupied by the snowy peaks and ridges, and by a very lofty table-land to the southward. The rest of the province is to the eastward of the Andes, and consists of a series of mountain-ridges, with rivers between them, which branch off from the main chain, and gradually sink down into the vast Amazonian plain. They are covered with forests, the home of the inestimable chinchona-trees, and present some of the most magnificent scenery in the world. It had always been believed in Peru that the rivers of Caravaya, and those further to the north-west which drain the Cuzco Andes, formed the sources of the Purus. The great discovery of Mr. Chandless, who found the sources of the Purus and of the Aquiry in the forests, at a distance from the mountains, has proved that this was an error, although a glance at the map will show that it was a very natural one. Señor Raimondy now tells us that it has been discovered that these Cuzceñan and Caravayan rivers are actually tributaries of the Beni, one of the three main affluents of the Mamoré. Don Faustino Maldonado, a native of Tarapoto, whose exploration of the Ucayali was brought to the notice of the Geographical Section of the British Association at Leeds in 1858, lost his life in making this discovery. On the 5th of February, 1861, he constructed a canoe, and, with seven companions, embarked on the river Tono, near its confluence with the Piña-piña. These rivers flow through the forests of Paucar-tambo, to the eastward of Cuzco, and form the Madre de Dios or Amarumayu River, which, after uniting with the Ynambari from Caravaya, has hitherto been supposed to form the main source of the Purus. Maldonado continued to descend this great river, passing many mouths of affluents, generally entering on the right bank, until he reached a rapid which obliged him to land, and repair his canoe. Soon afterwards he entered the river Mamoré, and found himself among the savage Caripuna Indians. On the 18th the canoe was capsized in a rapid called *Calderao do infierno*, and Maldonado was drowned, with three of his companions. The other four continued the descent of the Mamoré and Madeira, passing the town of Borba, and entering the river Amazons. They obtained a certificate from the Brazilian authorities at Barra, and returned to Tarapoto, their native place.

on the Huallaga. In the beginning of 1862 these four companions of the unfortunate Maldonado ascended the river Ucayali to Cuzco, and showed the authorities there the certificates of their perilous voyage. Maldonado was unacquainted with the names of the rivers which he navigated in his frail canoe, but as the Beni is the only large river which flows into the Madeira in that part of its course where the Caripuna Indians are met with, as we are informed by Lieut. Gibbon, U.S.N., Señor Raimondy is of opinion that the united Ynambari and Madre de Dios flow into the Beni, and that Maldonado entered the Madeira by descending its tributary the Beni. He is confirmed in this opinion by the circumstance that the account given of the mouth of the Beni by Maldonado's companions, agrees with the report of Señor Palacios, who explored a portion of the Beni many years ago, by order of the Bolivian Government. These interesting particulars are supplementary to the discoveries of Mr. Chandless, and finally settle the long doubtful geographical question respecting the numerous rivers which drain the Andes of Cuzco and Caravaya. They are sources, not of the Purus, but of the Beni.

Señor Raimondy's own valuable labours were confined, on this occasion, to a careful examination of the courses of the two most western Caravayan rivers, the San Gavan and Ayapata, from the Andes to their mouths in the Ynambari, and also of that portion of the Ynambari itself between the mouths of these two tributaries.

The villages of Caravaya are situated near the commencement of the forest region, in the deep ravines formed by the rivers, at an elevation from 6000 to 8000 feet above the sea. Those visited by Señor Raimondy, on this occasion, were Ituata, Ayapata, and Ollachea. He describes the climate as agreeable, but as occasionally foggy. In the mornings the loftier regions are free from mists, while the warm forests below are covered with a dense cloak of fog, which, when looked at from above, appears like a sea of fleecy vapour. The upper regions then receive the first rays of the sun, and, becoming warm, a current of air rushes up from the forests below, bringing with it dense masses of vapour. After visiting the sources of all the streams which form the rivers Ayapata and San Gavan, he commenced an adventurous journey down the valleys of Ollachea and San Gavan, in order to examine the whole course of the river, as far as its confluence with the Ynambari. The river San Gavan flows through a ravine so narrow that, in many places, there is no room for a path between the cliffs and the water. At last the gorge became impassable, and it was necessary to return to Ayapata, and reach the San Gavan River, by another route,

across the forest-covered mountains. Señor Raimondy describes the scenery at the point where the forests commence, as grand and majestic in the extreme. The eye extends over a vast panorama of verdure, bounded only by the horizon, with the silvery sheen of reaches of the rivers showing here and there through the foliage. Unfortunately the dense masses of cloud only occasionally open, so as to disclose this sublime prospect. Generally the view consists of a rolling mass of fleecy clouds, with a few forest-covered hills, rising up, like islands, in the midst.

Descending into these cloud-covered forests, Señor Raimondy reached the estate of San José de Bellavista, on the banks of the San Gavan, the extreme limit of civilization. Here a most enterprising Peruvian, named Aragon, cultivates sugar-cane for making rum, cocoa, coffee, pine-apples, and maize for the support of his labourers. This estate is 2400 feet above the level of the sea. It is well within the haunts of the savage Indian tribe of Chunchos, and has frequently been attacked by them, especially in 1851 and 1862.

Raimondy left San José on the 7th of September, and entered the unexplored forests with a few Indians and 15 days' provisions. They had to force their way through the tangled vegetation, and, in some places, where perpendicular precipices rose sheer up from the river, it was necessary to make a sort of Jacob's ladder of *lianas*, and so ascend the wall of living rock, descending again where it receded so as to leave walking space between the cliffs and the river. It took a whole day to advance a league in such a country.

At length they reached the banks of the great river Ynambari, at a point where it is more than 200 yards in width. At the confluence of the San Gavan and Ynambari the elevation above the sea is 1570 feet. Señor Raimondy is of opinion that, at a very short distance below this point, the Ynambari would be found to be navigable, because the hills here become very low, and soon afterwards sink altogether into the vast Amazonian plain. Between this point and the confluence of the Madre de Dios the slope is less than 8 feet per league.

Señor Raimondy then followed the course of the Ynambari up-stream, until he reached the point of its confluence with the Ayapata, a distance of about 12 geographical miles. He returned by following the course of the Ayapata up-stream, encountering great difficulties, hacking his way step by step through dense forests, wading across rapid streams, crossing the river on trees cut down and thrown over it for the purpose, and scaling most formidable precipices. The provisions ran short, and hunger added to the fatigue of this return journey.

The results of his expedition were—the exact delineation of the courses of two important affluents of the Ynambari, and of a portion of the course of that river itself; the more correct fixing of the positions of the villages of Ollachea, Ayapata, Ituata, Corani, and Macusani; and the discovery that the San Gavan and Ayapata flow directly into the Ynambari, without uniting either with each other or with the river Marcapata, as they are erroneously made to do on most modern maps. Señor Raimondy made careful meteorological observations at each encampment, and his paper is enriched with numerous valuable notes on the trees he met with during the course of his expedition; which give some new information respecting the geographical distribution of plants, as regards elevation above the sea, in a very important botanical region.

There is reason to hope that, before long, we shall receive further communication from Señor Raimondy, as it is his intention to continue his explorations in the valleys of Caravaya.

Señor Raimondy's Paper will be printed entire in Journal, vol. xxxvii.

The PRESIDENT, in returning thanks to Mr. Chandless, reminded the meeting that this was the first appearance before the Society of this successful traveller, since receiving the Royal Medal last session for one of the most remarkable geographical explorations ever undertaken by one individual. Mr. Chandless had qualified himself for his recent researches by long explorations in various parts of America. He began by traversing North America, publishing an interesting book on the journey, entitled 'A Visit to the Salt Lake;' and he afterwards travelled through South America, from the Paraguay to the Amazons, down the Tapajos River. Mr. Chandless then devoted about two years to the exploration which gained for him the highest distinction of this Society, namely, that of the river Purus, a tributary of the Amazons, which he ascended for more than 1800 miles. He at the same time laid down the various windings of the river by accurate observations. Mr. Chandless had performed this labour entirely at his own expense. He (the President) believed that it was no exaggeration to say that the Society had never previously had before it any one who, at his own instance, had accomplished so much as Mr. Chandless.

Mr. MARKHAM said that it must have struck all those who had read works on the subject of the valley of the Amazons, how very fortunate that region had been in its scientific explorers. In the last century there was the great name of La Condamine, and we had had in this century many men of scientific reputation who had visited and written about different portions of the Amazons Valley—Humboldt, Spix, and Martius, Poeppig, Castelnau, and Smyth, and, in later years, Bates, Spruce, and Wallace. That region had been most fortunate in its latest explorer, Mr. Chandless. The Society had seldom received a more admirable piece of geographical work than the minute and complete maps of the Purus and Aquiry rivers which Mr. Chandless has presented. Judging from the descriptions of the mouth of the Purus given by La Condamine and Smyth, that river appeared to be one of the most important secondary rivers in South America, but it had been scientifically unknown until 1864. Now, however, thanks to Mr. Chandless, it has been accurately mapped very nearly to its source, although Mr. Chandless modestly

omitted to state that he had reached the source. At all events, he reached a spot where his canoe grounded. His work is of great geographical value from the numerous astronomical observations made throughout the course of the river. The belief of the Peruvians, resting not on fact, but on opinion—a belief which he (Mr. Markham) had fully shared—was, that the drainage of the glorious eastern slopes of the Cordilleras of Carabaya and of Cuzco formed the sources of the Purus. That belief was now dispelled. It was at length known that neither the Purus nor any of its tributaries came near the Andes, and that their sources were in the virgin forests of the vast Amazonian plain. For this knowledge, and also for the great advantage of having the Purus thoroughly mapped, the acknowledgments of the Society were due to their gold medallist Mr. Chandless. The second Paper, which had been read, communicated the fact that the ill-fated Peruvian explorer, Faustino Maldonado, had ascertained that the rivers flowing from the Caravayan Cordilleras were tributaries of the Madeira, one of the secondary rivers of the great Amazons system. The people of Cuzco had a universal belief that the river which flowed through the forest eastward of Cuzco, called the Tono, was the headwater of the Purus; and when he (Mr. Markham) was at that ancient Inca city, 13 years ago, a noble old Italian missionary, Father Bovo de Revello, had recently published a pamphlet, entitled ‘*El brillante porvenir del Cuzco*’ (the brilliant future of Cuzco), in which he prophesied that hereafter, by the navigation of the Purus, the grand old city would be brought several thousand miles nearer Europe than its modern rival Lima. It was even now possible that the dream might be realised; but the road must be sought by the Madeira and the Beni, or possibly by the Aquiry, and not by the Purus. The discovery of Maldonado with respect to the rivers flowing from the forests eastward of Cuzco being affluents of the Beni, were very curiously corroborated, to a certain extent, by the historical narratives of the old Spanish conqueror Cieza de Leon, and of the Inca Garcilasso de la Vega. One of the great sovereigns of the great empire of Peru, Inca Rocca, invaded the forests to the eastward of Cuzco, and discovered that all the rivers united and formed one stream, which was called the Amaramayu (the Serpentine), now better known as the Madre de Dios. Afterwards another Inca, named Yupanqui, made a road from the Andes to the banks of the Madre de Dios, and having spent three years in building canoes, in which to embark his army upon it, he descended it, and eventually reached the country of the Moxos, whom he conquered. If the Madre de Dios flowed into the Beni, the Inca would have reached the country of Moxos, which is in Bolivia. If it flowed in any other direction he certainly would not have reached that district. He (Mr. Markham) understood that Don Antonio Raimondy intended to continue his researches in this most interesting and important region; and he did not think that the Society could do better service than by giving every encouragement to such men, and by giving all publicity to their work. He trusted that Mr. Chandless would also continue his researches, and explore the Beni in the same admirable way in which he had done the Purus.

Mr. BOLLAERT said that his friend Professor Raimondy had written him lately that he intended to return to the region of these rivers. His explorations had been most interesting. The difficulties he had to encounter must have been very great, but his results were most accurate and could be relied on. His Paper and map were valuable contributions to the geography of the country.

Mr. BATES, who was called forward by the audience, said that he addressed the Society on the occasion of the reading of Mr. Chandless’s paper last year on his first journey up the Purus, and he was afraid what he might say now would be little but repetition. He had himself spent nearly five years in the

great plain of the Upper Amazons, through which the Purus ran, but he was not on the Purus itself. His head-quarters were at a little town called Ega, some 200 miles west of the mouth of the Purus, and situated on the banks of a lake, or expansion of the bed of a tributary, 5 miles broad and of unknown length. He thence made excursions in various directions; on one occasion for several months, a distance of 400 miles westward of his head-quarters. The whole region formed a nearly level plain, the only inequalities being rounded elevations of a clayey formation not more than 60 or 70 feet above the level of the river. It had been ascertained that this vast plain of the Upper Amazons extended at least 500 or 600 miles from north to south, and about 800 miles from east to west. It was entirely covered with forest, the trees matted and locked together by woody lianas, or climbing plants of infinite variety, and rising to an average height of from 120 to 150 feet. There was scarcely an acre of open or grass-land. The soil was most fertile. It was composed of alluvium—the deposits and washings of the river sediment accumulated during countless ages. In some parts, where the banks of the river were washed by currents, he had seen a depth of more than 20 feet of vegetable humus. This level country was traversed east and west by the main Amazons, a stream without a rock to interfere with its free navigation, up which steamers of considerable draught might proceed at all seasons of the year for 600 miles beyond the farthest point he had reached—a distance therefore of 2400 miles from the Atlantic. The river was already navigated monthly, by a line of steamers, to this distance. This great and fertile country, with all these advantages of easy communication, was, however, almost unpeopled. The population of the whole plain within Brazilian territory, the last time a rough census was taken by the Brazilian Government, amounted only to 40,000. On an average, the villages are about 100 miles apart, and each village contained not more than 600 or 700 inhabitants, the greater part of whom were pure-blood Indians, the rest being half-breeds and a few white families from the southern provinces of Brazil sent out to administer justice or attend to similar duties. This region would doubtless be a grand country in the distant future, and the banks of the main river Amazons would be the first to become peopled and flourishing, as the main stream alone offered an uninterrupted communication between the Atlantic and the fertile provinces of East Peru. The inhabitants of Southern Peru, beyond the reach of the main Amazons, had always looked to the Purus, one of its principal southern tributaries, as their future great highway to the Atlantic. The great interest attached to its exploration can therefore be readily understood. These hopes were damped by the results of Mr. Chandless' investigation, at least for the present, for the river was found to terminate in the midst of almost uninhabited forests. As, however, the great navigable streams of Southern Peru have been discovered to find their way into the Madeira instead of into the Purus, some might ask why the Madeira should not become this great channel of navigation? The reason was simply that this fine stream before joining the Amazons passed through a range of hills, the western frontier of the highlands of Brazil, and the navigation was interrupted by a succession of waterfalls. Small canoes could ascend only at high water and by much labour. All the other southern tributaries of the Amazons to the westward were far too short to reach Peru, and the Ucayáli, the largest of the westerly affluents, did not reach so far south as the rich province of Carabaya.

Mr. WALLACE, in answer to an invitation by the President, said he had not himself visited the interesting district described in Mr. Chandless' paper. There appeared, however, to be a very singular geographical fact brought out by the discoveries of Mr. Chandless, namely, a very great similarity or parallelism between the tributary rivers on the south of the Amazons and those on the north—particularly between the Purus and the river Uaupés, an

affluent of the Rio Negro, which he (Mr. Wallace) ascended. It was a very curious circumstance that an immense district of country immediately at the foot of the Andes, both north and south, should, apparently, not receive a single drop of water from those mountains. On the south of the Amazons there was an enormous triangular district, as large as France, between the Madeira and the Ucayali, and immediately below the great range of the Andes, and yet its rivers were not derived from that range. Exactly in the same manner, on the north of the Amazons, the Japura and the rivers east of it appeared to terminate in the great forest-plains before they reached the Andes. He had ascended the Uaupés far enough to ascertain the same fact with regard to this stream. Though prevented from reaching its source, he ascended to a point near a cataract, where the river, though very wide, was a slow, sluggish, black-water stream, and he heard that for 10 days' journey farther up it continued so all the year round. This was a sufficient proof that not a drop of water came from the slopes of the Andes. Hence, there were enormous plains north and south of the Amazons which were, by some means, cut off from the drainage of the Andes. It would be very interesting to ascertain what was the cause of this separation. It would appear probable that it must depend in some manner upon the peculiar contour of the country. There might be a local elevation or ridge near the foot of the range, but separated from it, which caused the water to flow north and south and find an outlet in one of the great rivers. He observed in the map figures indicating the altitude of the river Purus at different points. He wished to ask Mr. Chandless whether those figures could be relied on?

MR. CHANDLESS, in reply, said that he believed, quoting from memory from Mr. Wallace's book, it was found that the barometer stood higher at the town of Barra than at Pará, and he had found that at 600 miles up the Purus it stood higher than at Barra. That, of course, gave a false result as to elevation, but he believed that the observations were quite correct instrumentally. His barometer had been tested at Kew. Some allowance must be made for receding from the equator and the diminution of the equatorial depression of the barometer. He could not believe that at a point 1500 miles from the sea the elevation would be only 107 feet.

In answer to a question from Mr. MARKHAM, Mr. Chandless said that the greatest height he had observed on the Amazons was 1010 feet; and on the Purus about 1088 feet. This would accord with the general level of the country as ascertained by Señor Raimondy's observations; one-tenth of an inch variation of pressure on the barometer would be equal to 100 feet.

The PRESIDENT inquired the altitude of the ridges above the stream towards the headwaters of the Aquiry.

MR. CHANDLESS replied that the highest ridge was about 250 feet above the river. He did not see any land high enough to be called a chain of hills.

MR. MARKHAM asked whether Mr. Chandless saw any high land on the horizon in the direction of the Andes.

MR. CHANDLESS said that one of his men whom he sent up a tree reported that he could see blue hills about s.s.w. That would agree with the position of the hills on Mr. Markham's map.

MR. WALLACE asked whether Mr. Chandless had any simultaneous observations made at Barra while he was on the Purus.

MR. CHANDLESS replied that he had not. He had given, besides the means of his barometrical observations, the assumed means at the sea-level, but could not say whether these were correct.

DR. MANN said that the natural range of the barometer and the difference of pressure throughout the district of the Amazons could not be less than one inch, which was equivalent to a thousand feet. Although Mr. Chandless's

barometric observations were valuable in themselves, still they could not be relied on as indicative of height unless simultaneous observations were made elsewhere by a standard instrument, by which errors due to the variation of atmospheric pressure could be eliminated.

Mr. CRAWFURD said that it struck him that the tribes of Indians in the valley of the Amazons were much like herds of the lower animals. He believed that the reason of the paucity of population in that immense plain was the enormous quantity of timber which grew there. A country covered with forests was always deficient in useful plants capable of cultivation and in animals amenable to domestication. The fertile valley which had been spoken of might be very valuable some day, but the Spaniards and Portuguese had been in occupation of it for upwards of 300 years and made nothing of it. He wished to be informed by Mr. Chandless whether the different tribes of natives whom he met spoke the same language, or whether their languages were different and founded on the American principle of agglutination. He wished also to know what animals were met with on the Purus.

Mr. CHANDLESS replied that he had met eight tribes, speaking, he believed, as many different languages. As to the animals, he had seen the curassow-bird, the tapir, and the capivaras (or water-hog), the last of these being very common. Monkeys were to be found in the trees by the river-side, but he had met with scarcely any animals on his land journey through the forest, the noise of cutting the path through the timber having probably frightened them away.

To an inquiry from Dr. WEBSTER as to whether india-rubber-trees were numerous in the forest, Mr. Chandless replied that they were numerous far up the Purus. Those who were accustomed to prepare india-rubber said that it was of good quality.

Eighth Meeting, 11th March, 1867.

MAJOR-GENERAL SIR HENRY C. RAWLINSON, K.C.B., M.P., VICE-PRESIDENT, in the Chair.

PRESENTATIONS.—*Pearson Morrison, Esq.; Richard Baxter, Esq.; Edward Thornton, Esq., C.B.; Frederick Berridge, Esq.*

ELECTIONS.—*H. L. Anderson, Esq.* (late Chief Secretary to the Bombay Government); *C. F. Collier, Esq.; Colonel Richard Crewe; William Leighton Jordan, Esq.; William Martin, Esq.; Pearson Morrison, Esq.; James O'Brien, Esq.; Francis Beaufort William Quin, Esq.; William Rossiter, Esq.; Colonel J. C. Salkeld* (H.M.'s Indian Forces); *Charles William Shepherd, Esq., M.A., F.Z.S.; Edwin Story, Esq., M.A., St. John's College, Cambridge.*

ACCESSIONS TO THE LIBRARY SINCE THE LAST MEETING.—'Elementary Treatise on Quartz and Opal,' by George Trail, F.R.G.S. Presented by the Author. 'Polynesia: a Popular Description of the Physical Features, Inhabitants, Natural History, and Productions of the Islands of the Pacific; with an Account of their Discovery and

the Progress of Civilization and Christianity amongst them,' by G. F. Angas, F.L.S. Also, 'Australia: a Popular Account of its Physical Features,' &c. Presented by the Society for Promoting Christian Knowledge. 'Viaggio di Cinque Anni in Asia, Africa et Europe del Turco, di Gio Battista de Burgo, 1687.' Presented by S. M. Drach, Esq., F.R.G.S. 'Greenland—Eskimo Vocabulary for the use of Arctic Expeditions, 1853.' 'Eskimaux and English Vocabulary, for the use of Arctic Expeditions, 1850.' Presented by Capt. G. H. Richards, R.N., Hydrographer to the Admiralty. 'Beiträge zur Geologischen in Kaukasischen Ländern, von H. Abich.' With a map. Tiflis, 1865. Presented by the Author, H. Abich. 'Kertsch und Taman-Karten der Halbinseln Kertsch und Taman;' 'Aperçu Voyages en Transcaucasie en 1864;' 'La Geologie du Daghestan, 1862,' donations from the Académ. Scien. de St. Petersburg. 'An Elementary Physical Atlas, intended chiefly for Map-drawing and for the study of the great physical features and relief contours of the Continents; with an Introduction to serve as a guide for both purposes,' by the Rev. J. P. Faunthorpe, B.A., F.R.G.S. 'La Politique du Bresil, ou la Fermeture des Fleuves sous pretexte de l'ouverture de l'Amazone.' Avec une carte colorie. 'Recherches Hydrographiques de la Mer Caspienne, refermant la partie Astronomique de ces investigations.' St. Petersburg. From Vice-Admiral Tilenoy. 'Funf Jaren in Japan,' from 1863 to 1867. By J. W. J. L. C. Pompe van Meerdervoort. Purchased. 'Ueber Colonization in Ost Africa,' von Otto Kersten. Wien, 1867. Purchased.

ACCESSIONS TO THE MAP-ROOM SINCE THE LAST MEETING.—A Chinese Map of China, on 64 sheets. A Chinese Map of the Province of Shan-si; showing part of the Great Wall, and of the Hoang-ho or Yellow River. Presented by Dr. J. Lamprey.

The CHAIRMAN informed the Meeting that the President was unavoidably absent through indisposition; but he had forwarded to him, to be read that evening, a statement relative to the reported death of Dr. Livingstone. He (the Chairman) would first read the letter of Dr. Kirk to Mr. Bates, the Assistant-Secretary, which had been published in the 'Times,' and afterwards the communication of the President.

"MY DEAR BATES,

"Zanzibar, Dec. 26, 1866.

"I have written fully to Sir Roderick three weeks ago, *viâ* the Cape of Good Hope and St. Helena, again *viâ* Mauritius and Suez, with all information we yet have got regarding poor Livingstone.

"As I am going to Kilwa and Mikindany for a few days, to see if anything is there known of the sad story,—and to seek for any letters which may have been sent by Dr. Livingstone, before crossing Lake Nyassa,—I write a note to you, that may go by any ship passing here while I am absent. On the 5th of

December, nine Johanna men of the party which accompanied Dr. Livingstone came to Zanzibar, reporting that on the west of Nyassa, some time between the end of July and September, they were suddenly attacked by a band of Mavite, and that Dr. Livingstone with half his party were murdered. Those who returned escaped, as they say, through being behind and unseen, and they all depose to having helped to bury the dead body of their leader the same evening. Although in the details and in other things the accounts of the various men differ, they all agree that they saw the body, and that it had one wound—that of an axe—on the back of the neck. One man saw the fatal blow given.

"The attack was sudden, and Dr. Livingstone had time to overpower those who faced him, and was struggling to reload when cut down from behind. I fear the story is true, and that we shall never know more of its details. Full statements have gone home, but this may reach Aden by an American vessel during my absence.

"You will see, if this arrives first, that we have sad news for the Society on the way.

"J. KIRK."

The despatches and letters alluded to by Dr. Kirk had not yet arrived, and were not expected for a fortnight. The following were remarks on Dr. Kirk's statement communicated by Sir Roderick:—

"11th May, 1867.

"Regretting particularly that, owing to indisposition, I am unable to attend the Meeting this day, I beg the Fellows of the Society to recollect that, in announcing the reported death of my dear and valued friend Dr. Livingstone, I spoke of it as an event which required to be substantiated by better evidence than that of the nine men of Johanna in the Comoro Islands, who brought the sad intelligence.

"I am informed by travellers who know these people well, that they are Mahommedans who, if they became disgusted with or intimidated by the ferocious Pagan natives on the borders of the Lake Nyassa, might have abandoned their chief; and, having agreed upon the story they were to tell, would hold together firmly in maintaining its truth.

"There are also several parts of their narrative which seem to me to be difficult to understand. Their being hidden in a wood, and yet their observation of the attack on Livingstone being so accurately described.

"Again, if, as the Johanna men state, they buried their leader, is it likely that they would in such case not have brought away with them some relic to vouch for the truth of their story? Presuming that if hostile natives had killed Livingstone, they would have cared little for his note-books, one of them alone, or even a lock of his hair, would have been good auxiliary evidence.

"Further, when I recollect that many an African traveller who has returned safely to England has been reported to have been killed (usually by runaway natives who had deserted him), I shall not abandon all hope until Dr. Kirk, the former devoted companion of Livingstone, and who has gone towards the scene of the alleged disaster, shall have satisfied himself that the calamity really occurred, and that Philanthropists and Geographers have lost the great traveller who had already won for himself imperishable renown.

"I have only to add that the more detailed account which Dr. Kirk had sent to me, before the letter which appeared in the 'Times' was written, will, I apprehend, throw little new light upon the alleged murder, as it can be nothing more than a detailed account of the story as related by the Johanna men. The search into the truthfulness or otherwise of the account received must occupy some time.

"RODERICK I. MURCHISON."

He (the Chairman) agreed with Sir Roderick Murchison in all his observations. The story told by the men was a very lame one as it stood at present, and ought not to be accepted without verification. At the same time, it was ominous that it was now eight or nine months since the assassination was said to have taken place, and no despatch had been received contradicting it. In the mean time, all that could be done was, to have patience and await the result. He (the Chairman) was sure that they would all feel that, if Dr. Livingstone had perished, not only had science sustained an irreparable loss, but that almost every Fellow of the Royal Geographical Society had lost a personal friend.

The following Papers were read:—

1. *The Delta and Mouths of the Amu Daria, or Oxus.* By Admiral A. BOUTAKOFF.

THE paper gave an account of the exploration which the author undertook of the mouths of the Oxus in two expeditions, the first in 1848-9, and the second in 1858-9. The river first begins to bifurcate in lat. $42^{\circ} 12'$ and long. $60^{\circ} 15' E.$ of Greenwich. This is the head of the Delta, the central portion of which forms a sort of depression into which the waters of all the branches, excepting the westernmost (the Laudan), empty themselves in a series of lakes more or less overgrown with reeds. The mouth of the Laudan has a depth of $1\frac{1}{4}$ to $1\frac{1}{2}$ foot only across the bar. The eastern arm, which limits the Delta, is called the Kuvan-Djarma, or Kuk (Blue) River, and, towards the sea, the Yangy Su (New River). In 1848-9 the principal mass of the waters of the Oxus was discharged through this branch, so that at $9\frac{1}{3}$ miles from the mouth the expeditionary party drew fresh water from over the side of the vessel. In 1859, on the contrary, the Aral was quite salt close up to the mouth of the Yangy Su. The author, in September, 1859, ascended this channel, and at $22\frac{2}{3}$ miles found the navigation arrested by a rocky ridge extending right across its bed, over which the water was only from $1\frac{1}{2}$ to $2\frac{1}{4}$ feet. He was compelled, in consequence, to leave behind his principal vessel, a steamer of 40-horse power, and to continue the survey in an open steamer of 12-horse power, with a crew of 18 men. The breadth of the channel further up was from 50 to 80 fathoms, and the depth 5, 6, 7, and 8 feet. After throwing off this easterly arm, the Amu Daria flows to the n.w. and n., continually emitting small branches and one larger channel, the Karabaili, which spreads out over the depressions, out of which it afterwards runs off into the one common channel of the Ulkun Daria (Great River) the branch by which the greatest quantity of water now finds its way to the Aral. West of the Ulkun is the Taldyk mouth, which had, in 1848-9, a very rapid current, with a depth of 3 feet on the bar, but which had lessened to $1\frac{1}{4}$ and $1\frac{1}{2}$ foot in 1858. The fortified town of Kungraad,

on the left bank of the Amu Daria, numbers from 6000 to 8000 inhabitants, consisting of Uzbeks, Sarts, Kirghizes, and Karakalpaks. The author, in surveying the various mouths, was often watched by armed Khivans on the banks, but no serious resistance was offered to his operations.

The paper will be printed entire, with a map, in the 'Journal,' vol. xxxvii.

The CHAIRMAN said that he remembered the time, and it was only twenty-five years ago, when the report that a Russian steamer had entered the Oxus would have caused a sensation of alarm from one end of India to the other. He was happy to say that such was not the case now. The public both in India and England looked with perfect complacency, and even with gratification, on the advance which the Russian Government had been making in prosecuting geographical knowledge through Central Asia. It was the especial happiness of the Geographical Society that, apart from all political considerations, it could yield a hearty tribute of admiration and applause to any nation and to any individual who contributed to the extension of geographical science. The paper of Admiral Boutakoff was one of very great geographical interest. It furnished precise information on many points with regard to which we were absolutely ignorant before. No astronomical observation had been ever previously taken at the mouth of the Oxus, nor had we known anything of the delta of that river. Admiral Boutakoff, however, was already well known in Russia for his extensive and successful exploration of the other great river of Central Asia—the Syr Daria or Jaxartes, which also fell into the Aral Sea. He had, indeed, conducted a steamer for above a thousand miles up the Jaxartes; a geographical feat which would live in history.

Now there were certain points connected with the rivers Oxus and Jaxartes which he (the Chairman) proposed to bring prominently before the Meeting. They referred to a physical phenomenon which he believed was without parallel in the rest of the world, being, indeed, neither more nor less than the drying up at certain periods of history of the Sea of Aral, and its consequent disappearance from the map of Asia. The Aral, in terrestrial geography, might be compared with one of the variable stars in astronomy. As there were stars varying from the first to the fifth magnitude, so the Aral was at times a great inland sea 300 or 400 miles in length, at other times a mere reedy marsh, and even, occasionally, a hard desert land, so that travellers actually passed across it without being aware that they were travelling over the bed of a sea. Humboldt had devoted 200 pages of his famous work 'Asie Centrale' to the discussion of the geography of the Aral and the Caspian, and he had established beyond dispute that the Oxus had a variable course, sometimes falling into one sea and sometimes into the other; but he had not ventured to assert that the Aral ever disappeared altogether. Nevertheless, he (the Chairman) maintained that we had direct evidence of the fact in modern times, and he thought we had a right to assume its occurrence in ancient times.

The argument was briefly as follows: In all classical antiquity, from the earliest date, say from 600 years B.C. to 500 or 600 years after Christ—the Sea of Aral was utterly unknown in geography. There was not one single authority—Greek, Latin, or native Persian—who mentioned it. The two great rivers, the Oxus and the Jaxartes, which, by their contributions now form that sea, were described by all authors as falling into the Caspian. It must be remembered, too, that Alexander the Great conducted an army into that part of Asia, and employed officers for the express purpose of ascer-

taining the geographical configuration of the neighbouring countries. He sent his troops on an expedition along the shores of the Caspian, while he in person crossed the Oxus, and reached the banks of the Jaxartes. Hence he must have possessed accurate information as to those localities, and yet the account which his officers brought back to Greece was that both the rivers fell into the Caspian. This statement, indeed, was adhered to throughout antiquity, and a practical proof was given of its truth in the notice of the line of commerce which supplied Europe with the products of Asia. This commercial route was described as starting from the foot of the Indian Caucasus, following the Oxus down to the Caspian, ascending the Kur or Cyrus, and descending the Phasis into the Black Sea, and thence crossing into Europe. We had thus direct evidence, as it seemed, that in the days when this route was followed and described, the Oxus must have fallen into the Caspian.

The Chairman went on to say, that as the present Sea of Aral filled an inconsiderable depression in the table-land of Central Asia, having no springs, and being entirely dependent for its supply on the two great rivers already mentioned, so it followed that if those rivers at any time were diverted from the Aral, the sea would necessarily become desiccated in a very few years, and the bed of it would revert to its original condition of a mere depression in the desert. The levels were a very important element in considering this question. That of the Aral was 117 feet above the level of the Caspian, and 33 feet above the Black Sea, the Caspian itself being 84 feet below the Black Sea; so that if a communication were formed between the Aral and the Caspian, the Aral would naturally drain off into the lower basin. To proceed, however, with the argument. If, in the times of classic antiquity, there was a unanimity of evidence that the Oxus and Jaxartes flowed into the Caspian, so, from the beginning of the Mohammedan era, say from the year 600 to about 1300, or for a period of seven hundred years, there was an equal unanimity exactly the other way. During this period the Arabs and their political successors were in possession of the country. They were a literary and scientific people, and wrote numerous works on geography. They possessed the means of ascertaining full topographical details, and they invariably represented the two rivers as falling into the Sea of Aral, or the Lake of Kharezm, as it was then usually called. The only reasonable inference then seemed to be, that between the years 500 and 600 the course of the two rivers, owing to some natural disturbance, must have changed, and that, instead of continuing to fall into the Caspian, they became diverted into the sea of Aral, themselves, in fact forming that sea. Now came the most curious part of the question. From about the year A.D. 1300 to 1500, that is, for about 200 years, Europeans possessed means of becoming acquainted with the geography of Central Asia which had never been equalled up to the present day; for there were at that time frequent missions sent from the courts of Europe to Mongolia in Central Asia, and the ambassadors so employed had for the most part preserved records of their journeys. Colonel Yule, an associate of the Geographical Society, had recently brought a general summary of those records before the notice of the public in a most interesting work ('Cathay and the Way Thither'), of which he (the Chairman) could not speak too highly, and which he could not too strongly recommend to the notice of all lovers of geographical science. Colonel Yule's book contained records of many travels across Central Asia during the 13th and 14th centuries, and in not one of those records was the Aral mentioned, although the route of the travellers lay in most cases exactly across it. One of the authors in question, named Pegoletti, gave all the details of the commercial route at that time, which conducted from the Black Sea to China, and along which merchants conveyed the luxuries of Europe, and

returned with the tea and silk of China. There were, indeed, detailed notices of the route in question, not only in the itineraries of Pegoletti, but in the maps which were constructed from memoranda furnished by travellers between the 13th and 16th centuries. One of these was called the Catalan Map; another was a map preserved in the Palatino Library at Florence; another was the Borgian Map, and the most famous of all was the Venetian map of Saint Mauro; and in none of these was the Aral noticed. The travellers came in the first instance from the Volga to Sarachak, on the eastern shore of the Caspian; and from thence they passed to Otrar, on the Jaxartes, the route lying across the bed of the Aral, which, nevertheless, in no single instance was either mentioned in the itineraries or laid down in the maps. On these negative grounds alone he should consider it quite certain that at that time the Aral did not exist, but we had fortunately positive evidence to confirm that conclusion.

Probably some of those present had heard of a very famous man called Yar Mahomed Khan, who was chief of Herat, during the period of the Afghan war about twenty-five years ago. This person had sent to him (the Chairman) during the war, as a token of friendship, a Persian manuscript, which seemed to be of very great value on account of its rarity. It was a work written by an officer of the famous ruler of Herat, Shah Rukh Sultan, and contained, amongst other matters, a geographical account of the province of Khorassan about the year 1418. The writer seemed to have been a minister of the country, and evidently knew every village and stream in the province. He (the Chairman) had made three extracts from the manuscript, which he considered to be of the utmost importance, as they recorded a physical phenomenon, namely, the desiccation of the Aral, which he believed had never up to the present time been brought to the notice of the geographers of Europe, although, as before stated, the great Humboldt had devoted no fewer than 200 pages of his standard work to the discussion of this subject. In describing the lakes of Asia the writer came in regular order to the Aral, which was called the Lake of Kharesm, and he said, "In all the ancient books the Lake of Kharesm is described as the receptacle of the waters of the Oxus, but at the present date, which is A.H. 820 (A.D. 1417), the lake no longer exists, the Jyhún (or Oxus) having made a way for itself to the Caspian, into which it disembogues at a spot called Karlawn, as will be described hereafter in its proper place." Again, in describing the rivers of Asia, he said, "It is recorded in all the ancient books that from this point the River Jyhún (or Oxus) flows on and disembogues into the sea of Kharesm; but at the present day this sea no longer exists, the river having made for itself a new channel, which conducts its waters into the Caspian. The point of embouchure is named indifferently Karlawn and Akricheh. From Kharesm to the point where the river falls into the Caspian the greater part of the country is desert."

So much for the Oxus. With regard to the Jaxartes, this writer explained another point which was of some importance; for, although the Oxus might have been diverted into the Caspian, still, if the other river entered the Aral, it would still remain a sea. But it was stated as follows:—"The river of Khojend in the lower part of its course, passing into the desert of Kharesm, joins the Jyhún (or Oxus), and thus ultimately reaches the Caspian." From which passage he (the Chairman) understood that at that time, A.D. 1417, the Jaxartes below Otrar branched off from its present bed to the left hand along a line now marked by reeds and lagoons (see Meyendorff's map), and joined the Oxus between Kungrad and Khiva, the two rivers from that point flowing on to the Caspian in one and the same bed. This statement was of the more importance as it came from a writer thoroughly acquainted with the country. In addition to this, there was the testimony of the great Emperor Baber, who

of course knew the geography of his own country, and who said that the Jaxartes in his time did not enter the Aral, but was lost in the desert. His (the Chairman's) belief was that it sometimes reached the Oxus, and was sometimes evaporated in the desert.

Such is the history of the Oxus and Jaxartes up to about the year 1500. From that time a second change began to take place. The rivers were then found to be going back into the Aral. It might not be generally known that Mr. Anthony Jenkinson, the agent of some English merchants, passed across Central Asia to Bokhara as early as 1550. He landed on the shore of the Caspian at Ming-kishlag, and came down the coast to a point where, as he heard, the Oxus had formerly disembogued into the sea; but he was told that the river had lately changed its course and gone back into the Sea of Aral. The ruler of the country, Abul-Ghazi Khan, who had left a most elaborate history of it, gave distinct details of this occurrence, and mentioned the very year in which the river began to return into the Aral. He related how the stream gradually dried up, and formed the sea as it at present exists. Evidence indeed could be given of the condition of the stream, almost year by year, from that time to the present; but it would be sufficient to state that every modern traveller who had passed through those regions had found the old bed of the River Oxus exactly where it was originally described. It was first brought to our notice by Mouravieff, a Russian agent, who passed from the Balkan bay to Khiva in 1819. Subsequently Arthur Conolly, who was afterwards murdered at Bokhara, attempted to cross from Astrachan to Khiva, and he also came upon the old bed; and lastly Mr. Vámbéry, whom the Fellows might remember seeing at a meeting of the Society two years ago, in his famous journey across the Turkoman desert, traced the same broad river-bed, and found that it was perfectly well known as the ancient bed of the Oxus. Hence it seemed that there was sufficient evidence to show that in early times, say from the year 500 before the Christian era to the year 600 after the Christian era, both the rivers ran into the Caspian, the Aral being non-existent; that after that, up to the year 1300, they fell into the Aral; that for the next two hundred years—namely, from 1300 to 1500—they came back into the Caspian; and that then, at a fourth stage, they gradually flowed back into the Aral, and formed the sea as we now know it.

The changes thus noticed were very important in reference to what might be the future history of these rivers and these countries. It was quite certain that, as the Jaxartes was now in the possession of Russia, so the Oxus must also naturally and necessarily be, in the course of time. Now he would read what was stated by Russian writers as the probable result of that event. The Russians almost always called these rivers by the names of the Amu Daria and the Syr Daria, instead of the Oxus and the Jaxartes; but he would, in reading the extract, use the latter names as being better known:—

“The Oxus is, for many reasons, of greater importance to Russia than even the Jaxartes. It disembogued at one period into the Caspian, and its bed to that sea still remains. Some are of opinion that the course of the river can be again directed to its ancient bed, while others consider it impossible to do so. It can, however, be positively asserted that the existing information on this point is very superficial and inaccurate, and the question will never be satisfactorily settled until a scientific expedition be sent by the Government to investigate it in all its bearings. The south-eastern shores of the Sea of Aral are well adapted for uniting the Jaxartes with the Oxus, and encourage the hope that the united mass of water of two such great streams may force their way through the old bed to the Caspian. The importance of this connexion will readily be understood, when it is remembered that a water-route in continuation of the Volga will be thus created, which will extend for

3000 versts into the interior of Asia, and that the extreme points of this uninterrupted water-way will be St. Petersburg and the northern slopes of the Hindoo Koosh."

This was a result which he (the Chairman) considered highly probable, and he believed that many present at the meeting would live to see a direct water-communication from the Baltic to the vicinity of the Indian Caucasus, which was considered the natural geographical boundary of India. They must remember that already there was a direct water-communication from the Neva, by means of canals, to Lake Ladoga, and thence to the upper course of the Volga, and down that river to the Caspian. Then, crossing the Caspian, vessels could reach the mouth of the bed of the Oxus. He looked upon that prospect without any apprehension or dismay, regarding it as the natural extension of civilization, and believing that it would be for the general advantage of mankind. Sir Roderick Murchison had often observed from that Chair that the Fellows of the Society assembled for the discussion of geographical and not political questions: but he (Sir H. Rawlinson) could not avoid saying that he did not look with any apprehension on the opening of this water-communication; and he was very glad to find that Russian officers were able to help English geographers towards a more thorough knowledge of the geography of Central Asia. They were gratified that evening by the presence of the brother of Admiral Boutakoff, the author of the paper, and he hoped he would say a few words on the subject of the expedition.

Admiral BOUTAKOFF said that it afforded him the greatest pleasure to have heard the terms in which the Chairman had spoken of his brother's efforts in furthering the science of Geography. It would certainly be one of Admiral Boutakoff's greatest rewards for the trouble he had taken in the survey that this Society felt interested in his researches.

Lord STRANGFORD advocated the uniform use of the names "Oxus" and "Jaxartes," and the other classical names for the rivers of Asia, in preference to the vernacular terms adopted by the Russians, such as "Amu Daria" and "Syr Daria." He also held up as highly worthy of imitation the combination of scientific life with practical life which had been made by Sir Henry Rawlinson while engaged in the public service in the heart of Central Asia. Such a combination was quite unique.

Admiral OMMANNEY asked whether Admiral Boutakoff communicated any information regarding the soundings of the Aral, for the absence of any depression in the middle of the Sea of Aral would bear out all that the chairman had stated.

Admiral BOUTAKOFF said he could not recollect what the soundings were, but he could state that they had been published in the charts that had been made from his brother's survey.

The CHAIRMAN said that a translation of Admiral Boutakoff's original survey of the Sea of Aral was to be found in the Transactions of the Society, and in that account the soundings were given. The sea was shallow throughout. He believed that its elevation of 117 feet above the Caspian would allow sufficient fall, in a distance of 250 or 300 miles, to drain the water into the Caspian. They may have remarked that Admiral Boutakoff seldom found more than two or three feet of water on the bars at the mouths of the delta of the Oxus. This shallowness would of course prevent the entrance of any large vessel, but by means of dredging-machines a depth of two or three feet might be increased to a fathom or a fathom and a half, very much as was done in St. George's Channel, at the mouth of the Danube.

2. *A Trip to Thibet, Kylas, Source of the Sutluj, and the Mansurwur and Rakhas Lakes.* By Captain H. U. SMITH, Indian Army.

I and my companion, Mr. A. S. Harrison, M.A., left Nynee Tal the end of June, 1865; but as the first twenty or thirty marches were through well-known ground, I will take up my diary from the 31st of July and start from Shib and Chillum, two camping-grounds well known to all traders and the turning-point for all sportsmen. Being well aware that our only chance of getting past the boundary was by deceiving the natives as to the number of days' provisions we had with us (as the Tartars are cunning enough to count up the number of yaks each sportsman has with him, so as to calculate to a nicety how long his provisions will last), for they would have immediately suspected our intention of penetrating into the interior had we taken more than a few days' supply, we had previously forwarded by another pass, and under the care of a trustworthy trader, a very large supply of provisions and ammunition, and had given directions for them to be packed like native merchandize and taken to Kylas, where we hoped to join them.

On reaching Shib our difficulties began. The guard of Tartars, who are always attached to every European who enters Thibet, informed us that we had reached the utmost limit for Europeans, and that it was their duty to prevent our proceeding further. After a long argument and plenty of brandy we were permitted to march to Iydum, some 20 odd miles to the east. Arrived at Iydum, we halted some days for shooting and to decide upon our future movements, to blind or get rid of our Tartar guard, for, though not formidable in themselves, they would have soon raised the country had they guessed our intention of visiting the lakes and their holy of holies, Kylas. The only plan that appeared feasible was to leave most of our things in their charge and the few servants we could spare, and pretend to be off for a few days' shooting on the top of the surrounding hills. Two or three of the Tartars were extremely anxious to accompany us, not only to keep us in sight but for the sake of any game we might kill; however, we persuaded them to stay behind and guard our camp and servants from the attacks of Dacoits or Tartar robbers. As not even one of our servants had a notion of our intentions, we were able to get off and put 50 miles between us and them: we marched for dear life, halting only a few hours during the night, and arrived at Kylas late the next evening. I may here mention that Kylas is a little territory held by the priests, who are quite independent of the Chinese authorities, and have the power of life and death in their own dominions. We had

previously met the high priest and exchanged visits with him at Shib, where he had gone on a trading expedition: we had taken him into our confidence and asked his advice as to the best means of evading the Tartars and paying a visit to the lake. He told us that he had no power to help us out of his own district, but that if we could manage to reach him at Kylas, he would not only protect us but furnish guides and help us to the best of his ability. When close to Kylas we despatched a messenger to inform him of our approach, and asking him to appoint a place for us to encamp in. We waited with some anxiety for his reply, for we had only his word to go upon, and, had it been merely native politeness, all our plans would have been frustrated. The answer soon came that he was delighted to hear we had got through, that a camping-ground was being prepared for us, also provisions (the latter very scarce in those parts), and we found everything ready for us on our arrival.

Kylas, or rather the village of Darchin, where the high priest dwells, is situated at the foot of the hill, and is composed of one house (the priest's) and three or four huts, built on the right bank of a beautiful little stream which comes down from the mountain. We found a good number of outsiders in tents, who, together with the small population of Darchin, turned out to greet us and watch our every movement during the time we stayed there. Very few had ever seen an European, and our tents, beds, knives and forks, and the way our dinner was cooked, afforded them the greatest delight and wonder. The next morning we paid a visit of ceremony to the high priest, who received us in great state, and presented each of us with a warm Tartar chupkan or coat. We then left and returned to our tents, and he paid us a return visit. We were rather at a loss to know what to give him in return; but luckily Mr. Harrison had an air-gun with him, which we made over with several bottles of brandy. The brandy was soon drunk, but the air-gun will remain for many years the most sacred and mysterious relic in his possession.

The two visits of ceremony being happily over, we proceeded to business and asked him for one or two of his men who knew the country and could guide us to the best shooting-grounds. He ordered two men to accompany us, and we prepared for a start; but in the midst of our preparations who should come in but our Tartar guard, who threw themselves at the feet of the high priest and implored him to send us back with them. He, however, kept his promise to us and behaved nobly, pacifying the guard and inducing them to return without us: we then made our bow and started off in great glee for the Mansurwur Lake, which we found to be about 15 miles from Darchin, and encamped at the head of the lake under a

temple called Jekep. Early the next morning, the 13th of August, I put my rod together and tried a small fly and succeeded in catching twenty-six fish, running from 1 to 2 lbs.: they were without scales and rather bony. I saw some very large fish, but not having a boat I did not succeed in hooking one. This I much regret, as I fancied I saw "marseer" or a fish almost identical. We picked up some scales that must have belonged to a 60 or 80 lb. fish. The small fish that I caught were bold and eager at a fly, and fought well when hooked. From the lake we marched about 50 miles to the east and north: the first two marches were on the high road to Lhasa. We then turned to the north and kept under a large range of hills running north and south. After shooting snow-antelope and gazelle, we turned to the left and went up a valley of the Kylas range, where I was lucky enough to shoot a black wolf, the first ever shot in that part of the world. Although this may appear irrespective of what I am writing to you about, I think it as well to mention that this animal appeared to be totally unknown in the country, so much so that when I brought it in none of the natives could inform me what it was. On enquiry I find it is known in Siberia; but in this part of the world this is the first instance in which it has been met with. I have its skin and head.

We then returned to the Mansurwur Lake, and after a few days' fishing and shooting we paid a farewell visit to the high priest at Kylas, and travelled by easy marches towards Gortok. Our principal object being to track the course of the Sutluj and see if there were any outlet from the lake northward. We carefully skirted both the Mansurwur and Rakhas lakes, and found from the nature of the ground that it was quite impossible that any effluent from either lake could reach the Sutluj, nor was there any trace of an old bed or watercourse, as mentioned in Henry Strachey's paper to the Society regarding his journey in 1846; besides which it would be against the laws of gravity for water to reach the Sutluj from the Rakhas Lake, as it would have to travel a very uphill journey. The Sutluj turns almost at right angles on meeting a small range of hills, and at the nearest point must be fully 12 miles from the Rakhas Lake.

Both Mr. Harrison and myself took the greatest pains to examine the course of the river, and traced it step by step till it entered the Kylas range, where we could step across it without wetting the sole of our shoes, besides walking over every inch of the ground from the small range of hills to the Rakhas Tal; and we are both convinced that it is quite impossible there can be any connection between the two, neither is there the slightest trace of any stream or old

watercourse connecting the Mansurwur and Rakhas lakes : in fact, the Mansurwur Lake is surrounded by a small range of hills, and though fed by many streams from the Kylas range, there is no possibility of any escape (except from evaporation) on the north side of the lake. We took the best evidence procurable, and except in one instance, where the man said he thought that water from the lake might percolate underneath the hill and thus reach the Sutluj, our own ideas were strengthened and substantiated by the opinion of every one we met; in addition to which it was so palpable, that we need hardly have asked any questions.

The CHAIRMAN said that this paper was mainly interesting, in consequence of its differing on a point of physical geography from previous discoverers, and the statements of Colonel Strachey.

Dr. THOMSON said that his knowledge of Lake Mansurwur was derived merely from the records and observations of the two Stracheys, and as he had travelled with them, and knew that they were very trustworthy observers, he did not think they were likely to be wrong. They were men quite capable of recognising a river when they saw it. The flow of a river from a lake in a dry country would vary very much at different seasons, and he did not think that a traveller merely going on a fishing excursion should pass a very decided opinion in contradiction of the observations of travellers who had preceded him. He was sure that Richard and Henry Stracheys' observations would be found quite trustworthy, when carefully studied by other observers.

Captain SMITH said that in handing the paper to the Society, he had no wish whatever to criticise Captain Strachey's observations. He (Captain Smith) and his friend went to the district spoken of more for shooting than anything else. He was not himself a scientific man, but his companion was thoroughly competent to judge. By mere accident they encamped at the spot where the course of the Sutluj turned in its descent from the Kylas. They had Strachey's map with them, and they followed the course of the river up to the hills, where it came out, and, not satisfied with that, they returned the same way, to ascertain whether it was possible that there might be any drainage running out of the Rakhas Lake to the Sutluj, and they found that it would be simply impossible for any water from that lake to reach the Sutluj, for it would have to run up-hill. He submitted his observations to the Society with all due respect, and he hoped that some other traveller would go and clear the matter up.

Dr. THOMSON repeated that he did not think it at all likely that Major Strachey would be mistaken in his observations. He was well able to judge of the physical contour of a country. It was a very difficult thing to judge of the levels of a country without having the eye exercised in this class of observations. Rivers would find their way round corners in a way which ordinary travellers might not always detect, and the authors of the paper might be mistaken as to the impossibility of the water from the Rakhas Lake reaching the Sutluj.

Ninth Meeting, 25th March, 1867.

SIR RODERICK I. MURCHISON, BART., K.C.B., PRESIDENT,
in the Chair.

ELECTIONS.—*Rev. John C. Brown*, LL.D., F.L.S. (Professor of Botany, South African College, Cape Town); *Colonel Edward Conran* (Administrator of the Gold Coast); *John Dugdale, Esq.*; *Lieut.-Colonel Francis W. Newdigate* (Coldstream Guards).

ACCESSIONS TO THE LIBRARY SINCE THE LAST MEETING.—‘*La Question du Pole Nord, par Gustave Lambert.*’ From the Author. ‘*The North-west Peninsula of Iceland, being a Journal of a Tour in Iceland in the Spring of 1862,*’ by C. W. Shepherd, M.A. From the Author. ‘*Le Jardin des Racines Grèques mises en vers François, 1719.*’ Given by S. M. Drach, Esq., F.R.G.S. ‘*Cartes des Ventes dans l’Ocean Pacifique meridionale,*’ par le Comte Chasseloup Laubat. Le Ministre de la Marine. ‘*Instructions Nautiques sur les Traversers d’Aller et de Retour de la Manche à Java,*’ par C. le Hellaco. ‘*Reissen van Australie naar Java.*’ ‘*Maandelijksche Zeilaandwijzingen van het, Kanaal naar Java.*’ ‘*Anales del Museo Publico de Buenos Aires,*’ by Herman Burmeister, MED. DR. Presented. ‘*Five Years in Japan, 1863-67,*’ by Van Meerdevoort. Purchased. ‘*Ueber die Polärlander,*’ by Dr. Oswald Heer. Purchased. ‘*Notes on Columbus: with photographic facsimiles of the Handwriting of Christopher Columbus.*’ New York. Presented by the Hakluyt Society. Three drawings of people and habitations of Jesso, by a Japanese artist. Presented by J. Lamprey, Esq., M.D., 67th Regt. A miniature on copper of “Kama,” a Kaffir chief. Presented by R. J. Garden, Esq., F.R.G.S. Two photographs of Formosa natives. Given by R. Swinhoe, Esq. Drawings of Australian scenery, from Dr. Ferdinand Mueller, Melbourne. Presented by Sir Roderick Murchison, Bart.

ACCESSIONS TO THE MAP-ROOM SINCE THE LAST MEETING.—Map of the Province of Canterbury, New Zealand, with 5 sectional plans, showing the passable routes over the Alpine ranges from the west to the east coast. Scale, 1 inch = $\frac{3}{4}$ mile vertical, 3 miles horizontal, by J. Haast, Esq., Government Geological Surveyor. Presented by the Author, through Sir R. Murchison. A complete set of Maps, illustrating the campaigns in Germany in the summer of 1866, showing the battle-fields in Bohemia, &c., during the war between Prussia and Austria. 17 maps on 23 sheets. Scale, 1 inch = $\frac{4}{10}$ of a mile. Presented by Colonel Beauchamp Walker, C.B. A map of part of Palestine, showing the route from Jaffa to

Jerusalem, by C. Schick. Presented by Dr. A. Petermann. A map of Greece and the Grecian Archipelago. Presented by Dr. A. Petermann. Admiralty Charts, 8 in number. Ordnance Sheets, 94 in number.

The Paper of the evening was the following:—

DESPATCHES and LETTERS relating to the last Journey and reported Death of DR. LIVINGSTONE. By DR. G. E. SEWARD, Acting-Consul, and DR. J. KIRK, Vice-Consul at Zanzibar.

1. *Despatches from DR. SEWARD, H.M. Acting Political Resident at Zanzibar, to Lord Stanley, Secretary of State for Foreign Affairs.*

(Communicated by the FOREIGN OFFICE.)

“MY LORD,

“Zanzibar, December 10, 1866.

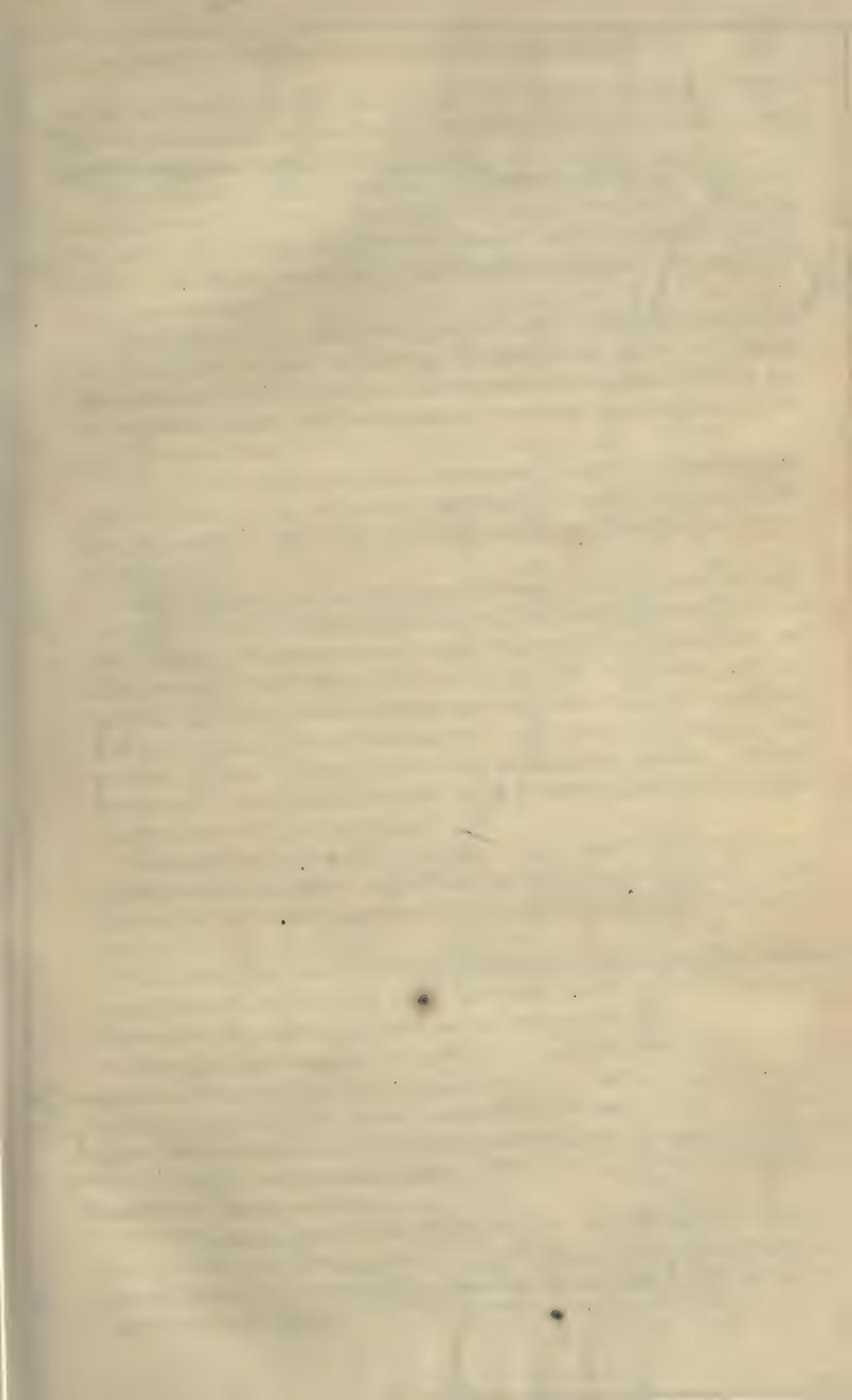
“I send you the saddest news. Dr. Livingstone, in his despatch from Ngomano, informed your Lordship that he stood ‘on the threshold of the unexplored.’* Yet, as if that which should betide him had already thrown its shadow, he added, ‘it is best to say little of the future.’

“My Lord, if the report of some fugitives from his party be true, this brave and good man has ‘crossed the threshold of the unexplored;’ he has confronted the future, and will never return.

“He was slain, so it is alleged, during a sudden and unprovoked encounter with those very Zulus of whom he says, in his despatch, that they had laid waste the country round about him, and had ‘swept away the food from above and in the ground.’ With an escort reduced to twenty by desertion, death, and dismissals, he had traversed, as I believe, that *terra incognita* between the confluence of the Loende and Rovuma rivers at Ngomano, and the eastern or north-eastern littoral of Lake Nyassa; had crossed the lake at some point, as yet unascertained; had reached a station named Kompoonda, or Mapoonda, on its western—probably its north-western—shores; and was pushing west or north-west into dangerous ground, when between Marenga and Maklisoor a band of implacable savages stopped the way, a mixed horde of Zulus, or Mafite, and Nyassa folk.

“The Nyassa folk were armed with bow and arrow, the Zulus

* “The dim outline of highlands appears even at this distance. They raise the spirits, but possibly this is caused partly by the fact that this is about 30 miles beyond our former turning-point and the threshold of the unexplored. I propose to make this, *i.e.*, Ngomano, my head-quarters till I have felt my way round Lake Nyassa. If prospects are fair there I need not return, but trust to another quarter for fresh supplies, but it is best to say little of the future.”—See ‘Proceedings Royal Geographical Society,’ vol. xi. p. 15.



with the traditional shield, broad-bladed spears, and axes. With Livingstone there were nine or ten muskets; his Johanna men were resting with their loads far in the rear.

"The Mafite instantly came on to fight; there was no parley, no avoidance of the combat; they came on with a rush, with war-cries, and rattling on their shields their spears. As Livingstone and his party raised their pieces, their onset was for a moment checked, but only for a moment.

"Livingstone fired, and two Zulus were shot dead (his boys fired too, but their fire was harmless); he was in the act of reloading, when three Mafite leapt upon him through the smoke. There was no resistance, there could be none, and one cruel axe-cut from behind put him out of life.

"He fell, and, when he fell, his terror-stricken escort fled hunted by the Mafite. One, at least, of the fugitives escaped; and he, the eye-witness, it is who tells the tale—Ali Moosa, chief of his escort of porters.

"The party had left the western shores of Nyassa about five days. They had started from Kompoonda, on the lake's borders (they left the Havildar of Sepoys there dying of dysentery, Livingstone had dismissed the other sepoy of the Bombay 21st at Mataka), and had rested at Marenga, where Livingstone was cautioned not to advance. The next station was Maklisoora; they were traversing a flat country broken by small hills, and abundantly wooded. Indeed, the scene of the tragedy so soon to be consummated would appear to have been an open forest-glade.

"Livingstone, as usual, led the way—his nine or ten unpractised musketeers at his heels. Ali Moosa had nearly come up with these, having left his own Johanna men resting with their loads far in the rear.

"Suddenly he heard Livingstone warn the boys that the Mafite were coming; the boys in turn beckoned Moosa to press forward. Moosa saw the crowd here and there between the trees.

"He had just gained the party, and sunk down behind a tree to deliver his own fire, when his leader fell. Moosa fled for his life along the path he had come, meeting his Johanna men, who threw down their loads, and in a body rushed off into the deeper forest. If the Mafite really passed Moosa, his escape and that of his people verges on the marvellous.

"However, at sunset, they in great fear left their forest refuge, and got back to the place where they hoped to find their baggage. It was gone, and then with increasing dread they crept to where the slain traveller lay.

"Near him, in front, lay the grim Zulus who were killed under his sure aim; here and there lay scattered some four dead fugitives of the expedition. That one blow had killed him outright, he had no other wound but this terrible gash; it must have gone, from their description, through the neck and spine up to the throat in front, and it had nearly decapitated him. Death came mercifully in its instant suddenness, for David Livingstone was 'ever ready.'

"They found him stripped only of his upper clothing, for the Mafite had respected him when dead. They dug with some stakes a shallow grave, and hid from the starlight the stricken temple of a grand spirit—the body of an apostle of freedom, whose martyrdom should make sacred the shores of that sea which his labours made known to us, and which, now baptized with his life's blood, men should henceforth know as 'Lake Livingstone.'

"The names of those who stood before the Mafite, with Livingstone, should not be unremembered:—

Adam.

James Chooma.

Maka.

Abraham Pariella.

Simon Price.

Edward Gardner.

Albert Baraka.

Lakoombo.

Malbrook Jooma.

Ali Moosa.

Of these, four were seen dead near the corpse of Livingstone; the rest, save Ali Moosa, are missing.

"The Johanna men made the best of their way back to Kompoonda or Mapoonda, not venturing near any village or station; they lost themselves in the jungle, and were fourteen days on the way.

"At Kompoonda they witnessed the end of the Havildar of Sepoys, Bombay 21st Native Infantry. He alone of all the Indians was faithful; on the threshold of this Consulate at Zanzibar, he pledged himself at the moment of starting never to forsake his leader—nor did he; to the last he struggled on, worn with dysentery, but broke down hopelessly on the road to Marenga. A day or two later, and he would have shared his leader's fate.

"Insubordinate, lazy, impracticable, and useless, Livingstone had dismissed the other sepoy at Mataka. Had they been faithful like their Havildar, I should not have had to inscribe a record of this sad happening. Their unfitness for African travel might have been predicted. At Kompoonda the Johanna men were deprived of their weapons by the Chief, who also kept the Havildar's. Here they joined an Arab slave-caravan, re-crossed the Nyassa, and made for Keelwa, the great slave outlet on the Zanzibar coast.

"But here again, and where least expected, they encountered the Mafite. They had reached Keepareygree, eight days south-west of

Keelwa, when the appearance of a band of these savages scattered the caravan. Abandoning ivory, slaves—their all—the Arab leaders thought but of saving their lives. The Johanna men again made their escape, and reached Keelwa, whence by the kindness of the Customs people they were at once sent on to Zanzibar. They arrived here on the 6th of December.

“It will be gratifying to the many and true friends of Dr. Livingstone to learn that, when on his sad end being known, the British flag was lowered at this Consulate, the French, American, and Hanseatic flags were at once flown half-mast-high, the Consuls paying a spontaneous tribute to his memory—an example shortly followed by all the foreign vessels in the harbour. The Sultan’s flag was also lowered.

“I must reserve other details for a subsequent letter; but I may state that no papers, effects, or relics of Livingstone are likely to be recovered.

“G. EDWIN SEWARD.

“*Postscript.*—The date of Dr. Livingstone’s death is left as much to conjecture as the place of his grave.

“All that we certainly know is, that he was at Ngomano on the 18th of May last; that he proceeded to Mataka, whence he sent a despatch to this Consulate.*

“From Mataka he is said to have made for and struck Nyassa, which he crossed; but where—or where Mataka is—cannot be ascertained.

“The runaway Reuben with the sepoy state that Livingstone left Mataka a few days before they set out on their return journey to Zanzibar.

“They were one month and twenty days on the road to Keelwa, which they reached during the latter days of September. It may be inferred from this that Livingstone left Mataka about the middle of July last.

“The Johanna men named six weeks as the probable time of their return journey from Mpoonda to Keelwa with the slave-caravan. The fight with the Zulus took place sixteen days before they set out. They reached Keelwa in November (Zanzibar, 6th December). Roughly, then, we may conjecture the death of their leader to have happened during September. The statements of our informants as to time, distance, and direction, are distressingly vague and untrustworthy.

“I purpose, however, and I shall associate Dr. John Kirk with

* This despatch has miscarried.

me in the labour, to visit Keelwa with the express purpose of conferring with the leaders of the slave-caravans there. Captain Bedingfeld of H.M.S. *Wasp* has obligingly consented to take me there, on his return from assisting a wreck in the neighbourhood.

“G. EDWIN SEWARD.”

“MY LORD,

“Zanzibar, 23rd Dec., 1866.

“My despatch of the 10th inst. dealt almost wholly with the manner of Dr. Livingstone's death, and but little was said that could interest geographers. I had, however, on the arrival of the Johanna men, requested Dr. John Kirk—so long Livingstone's associate—to make the geography of their statements his peculiar care.

“He has, to-day, December 23, handed in his report, which I have the honour to submit, together with the track-chart, which he has been good enough to construct.

“He has, I see, conceived Dr. Livingstone's route to be almost precisely that which the explorer himself, when my guest at Zanzibar, has over and over again pointed out on the map to me, and to Arabs of rank whom I wished to interest in his travels, as the one which he had determined on. And the intention of ‘feeling his way round Lake Nyassa,’ which Dr. Livingstone records in his despatch from Ngomano, shows that up to that time he had not given up his original plan.

“I think I shall soon be able to remove any uncertainty as to the position of Mpoonda or Kompoonda on the lake littoral. I learn that it is a populous and important place on the lake borders, and one of my informants has property and a resident agent there.

“It is said that Mataka first set the Zulus in motion westward, by inviting them to fall upon some Arabs, whom he himself was too weak to punish.

“Letters have just been received, stating that many Arabs had just been killed, and that too in perilous proximity to Keelwa. Certain it is that there is a general restlessness of the tribes between the East African coast and the lakes of the interior, and that trade is becoming less and less possible; and it is to this unpropitious condition of things that we may trace, perhaps, our irremediable loss.

“It may not be uninteresting to state that a brilliant and persistent rain of meteors, observed on the same November night both here and at Muscat, has been regarded as the certain sign and portent of ills present and to come, by Arabs in high places, who

associate the troubles in the interior and along the Arabian coast with this splendid starfall.

"In penning my previous letter I had it in my mind to anticipate doubts as to the verity of Dr. Livingstone's death, by giving reasons why the event should not be discredited. That the Johanna men alone should have escaped, whilst all the rest were missing, was certainly doubt-inspiring. But the defence which they at once put forward was one which could be accepted without difficulty; the more so as, in Dr. Kirk's experiences, the order of the little column tallied precisely with that observed in Livingstone's prior Nyassa wanderings.

"He led the advance, Moosa led the baggage-men. It so happened that they rested and were at the rear, and Moosa had strolled on in advance of his party, and saw what has been recorded.

"It is not supposed for an instant that Moosa himself was seen by the Mafite; his escape unseen, and his inability to warn his people, account for the seeming marvel of surviving a Zulu onset.

"But there was one point about which there was no prevarication, no hesitation, no difference, amongst the nine men. It was the one wound that had killed, and the solemn declaration that they had buried their slain leader.

"Again it must be remembered that these men returned to Zanzibar, when it would have been easier and safer to have gone home to Johanna. They came at once to the Political Agent, and invited, or at least laid themselves open to the scrutiny and cross-questioning, which they could altogether have avoided had there been foul play, or anything in their own conduct which they wished to conceal.

"They well knew too that, either in Johanna or Zanzibar, punishment would surely overtake them, were it ever discovered that the tale of their leader's death was spurious.

"I fear that we must accept Livingstone's death as one other of those mournful sacrifices which Africa insatiably demands from those who seek to let the light fall upon the mystery of her inner lands and Pagan people.

"G. EDWIN SEWARD."

2. DR. KIRK's *Report on the Route followed by Dr. Livingstone.*

"SIR,

"Zanzibar, 20th Dec., 1866.

"I have the honour to inclose a brief account of what in my opinion was the route followed by Dr. Livingstone, and with it a rough map, showing what seems to be the probable position of the leading places mentioned.

"You are well aware how impossible it is from such data as we

possess to arrive at a certain conclusion; I may, however, assure you that there seems nothing improbable in the narrative as I have received it, in regard to its geographical features.

"The customs, moreover, of the various tribes have been kept up throughout the detailed depositions made before you, and to which I do not here refer.

"One obvious source of error again meets us here; as Moosa and also one other of the Johanna men were of our party during two years on the Zambesi, Shiré and Nyassa, and these had the same means of learning the customs as I had.

"Still I regard the sad story as true, when stripped of what was obviously meant to conceal or apologise for cowardice.

"The recovery of the later despatches of Dr. Livingstone, written at Mataka, is imperative, as they will give a clue to his proposed course of action. I think it very likely that Dr. Livingstone again wrote before plunging into the Mavite country, of which none knew the danger better than he.

"From the confused and contradictory statements of the nine Johanna men now in Zanzibar, representing themselves as the only survivors of Dr. Livingstone's exploring party, it is impossible to indicate with certainty the route followed, the nature of the country passed, or the spot where Dr. Livingstone is said to have been attacked and killed.

"A personal knowledge of Lake Nyassa and acquaintance with the various tribes have aided me in arranging what I trust may prove, in its geographical points, as approximate to the truth.

"It will be remembered that the statements on which the following is based require verification, coming as they do from men whose cowardly behaviour gives an obvious motive for concealing the truth.

"After due allowance has been made, I regret being forced to the conclusion that Dr. Livingstone was attacked and killed by the Mavite a little to the west of the north end of Nyassa.

"The last letter we have from him was written on the 18th of May at the confluence of the Niende and Rovuma, called Ngomano. From Mikindany (on the coast) to Ngomano is a distance of 150 miles, of which the first 80 is level ground, covered with thick bush and forest. The remainder is more open, and studded with isolated masses of igneous rock and low ridges of syenite and schist, which cross the river-bed and render it impassable to boats.

"At Ngomano the river is joined from the south-west by the Niende. Here Dr. Livingstone crossed the Rovuma, and remained

some time with the chief at the confluence. The country to the north had been pillaged by the Mavite, a marauding Zulu tribe now settled to the west of Nyassa. This, added to a general drought, rendered provisions scarce.

"All the camels and many of the buffaloes had by this time died from the bite of the Tsetse fly; the men were therefore forced to carry loads, and a considerable amount of baggage was left behind.

"Leaving this place, they followed a westerly course, and after a day's march again saw the Rovuma for the last time.

"On the third day, having passed several plains and tracts of forest, they ascended hill-slopes clothed with bamboo-jungle. On the seventh they were at Makarika, a small Waiao village, where they stayed two days.

"Four days from Makarika they came to Mataka, a powerful Waiao chief, having much cattle and governing a populous district.

"On leaving Mataka, after a considerable stay, Dr. Livingstone lost eleven of the Bombay sepoys and two of the educated Africans who accompanied him. His party was thus reduced to twenty-three.

"After eight days' march they came to Makata, not far from Lake Nyassa. The border of the lake presented a flat sandy shore; it seemed to be about 6 miles wide, and the opposite shore a white sand, and no mountain of any consequence near, although large hills rose to the south. From the natives of a small fishing-village under Makata four canoes were hired, in which the party crossed. Embarking in the morning, they had all landed by noon; the water was shallow and the canoes propelled by large bamboo paddles, used only at intervals.

"There is certainly no part of the Nyassa south of lat. 11° which corresponds with this description. Throughout the 200 miles formerly explored it was found to be a deep blue lake, and at the only point at all narrow enough to allow of their crossing in the time mentioned, it is not only deep, but has a mountain ridge not far off its western shore. Besides, the head Johanna man, our present informant, was formerly one of the party on the Shiré, and accompanied Dr. Livingstone on foot beyond the point referred to; and, as he positively asserts that the old route lay far to the south, I have little hesitation in placing the spot where the lake was crossed as the unknown extremity at about $10^{\circ} 30'$ s. lat.

"There is a dilatation of the River Shiré soon after it escapes from the south end of Nyassa, much resembling what has been represented as found at the northern end; and I doubt not this is

the river I heard of as coming from a marsh near Mapunda. The account I received when on Nyassa, in lat. 11° , was that Sisia, Kondowe, Photo, Matete, Mapunda, Chisanga, and N'Karamba were the various places passed in going round the north end of the lake from where I then was to a point opposite.

"I was told that Chikamba, the chief of Sisia, fought with the Mavite, that at Mapunda a river entered from a marsh, but that the lake, ended before Mapunda was reached.

"There is good reason to think that Mapunda (or Kampunda), where Livingstone landed, is the same place as that I heard of in 1861. From Mapunda Dr. Livingstone went to Marenga; after two days' march west beyond, he crossed in canoes over a marsh. Thus he left the shores of the lake, and as his first object was to settle the extent northwards of Nyassa, we may presume that he had now done so and was on his way to Ujiji, perhaps by way of Cazembe. He seemed to have followed out the course mentioned in his letter of May 18, wherein he announced the intention of going on at once from Nyassa to Tanganyika, if his operations on the former were successful.

"Leaving Marenga, where they were well treated, a desolate country was entered, a region scoured by parties of Mavite, who are at constant war with their neighbours. At the last outpost of the lake people Dr. Livingstone was told that the Mavite were then near.

"On the morning of the second day's march from Marenga, about 9 A.M., when crossing a level plain with grass 3 feet high, and scattered brush and forest, a band of Mavite suddenly appeared and are said at once to have attacked, regardless of the loss of the foremost as they dropped to Dr. Livingstone's shot. The educated African boys were, as usual, near Livingstone, while Moosa, with the Johanna men, followed at a short distance behind. On seeing that something was wrong, Moosa went forward and from behind a tree observed three Mavite close upon Dr. Livingstone, who was at the time endeavouring to reload his gun. While thus occupied he was cut down by a blow of a battle-axe, which divided the bone of the neck. Moosa fled, and with him the other Johanna boys. It seems that being behind at the time and concealed in the bush they were not observed by the Mavite. However this may be, they say they were not pursued to a distance but lay concealed, and towards evening came up cautiously to see if the loads still remained where they had cast them down. Finding none, they advanced and saw Dr. Livingstone's body where Moosa had seen him fall. The upper clothing stripped and carried off, as were also his gun and every-

thing he carried. Near him were several of the African boys dead, and in front lay two Mavite. Having buried the body of their leader they left the spot, and after a time recrossed the lake at Kampunda ; but so confused is their story, that it is impossible to indicate their path to Keelwa further than that it lay north of that by which they went.

(Signed) "JOHN KIRK."

"To Dr. Seward, H.M.'s Acting Consul."

3. *Extracts from a Letter of Dr. KIRK to Sir R. I. MURCHISON, BART., dated the 9th December, 1866.*

"MY DEAR SIR RODERICK,

"Although the evidence is, in many points, contradictory in detail, and the survivors can give no clear account of their route, I find no cause to doubt their veracity in the main points of the narrative, and allow for much from the fact that an early flight alone saved them—an act of cowardice which would lead them in a measure to exaggerate some of the circumstances. One great difficulty is, that they speak the language of Johanna only, for this necessitates the use of unskilled interpreters.

"Our last communication from Dr. Livingstone was written by him on the 18th May. He was then at Ngomano, where he remained 15 days, and probably his letter was written about the beginning of that time, or soon after his arrival. We know that he started from Mikindany, struck the Rovuma about 30 miles from its mouth, and proceeded to Ngomano, without encountering any obstacle ; so far the natives were friendly, but the paths were most difficult, owing to the dense forest and tangled vegetation. I need not recount what he has narrated, and what has, no doubt, been communicated to you through Her Majesty's Secretary of State ; but shall briefly state, so far as I have learned, the condition of the party when at Ngomano. They mustered in all thirty-six, viz. :—Dr. Livingstone, 12 Bombay sepoys, 10 Johanna men, 9 boys (African) educated, and 4 Africans who had gone with him from the Zambezi to Bombay, where they awaited his return.

"Ngomano, on the confluence of Rovuma and Niende, is the country between these streams, so that he had crossed the Rovuma before reaching the village of the Chief, commonly named the 'N'donde.' The Niende was seen to be the main stream, the Rovuma being secondary to it. From previous expeditions we know that the Rovuma, below the confluence, is very subject to sudden rises and falls. In May it would be a considerable stream, but in October

and November a dry bed with hardly a boat-passage, and fordable every mile. Above the confluence of the Niende, therefore, it must have become a series of almost isolated pools, if the Niende was the main source. On Dr. Livingstone's arrival, the country was in a disordered state; a drought had injured the crop, and the little left had been carried off to the north of the Rovuma by a marauding tribe of Mavite. Dr. Livingstone seems to have obtained provisions from the Mabiha of the south-east, and 15 days after his arrival to have proceeded westward. The first day's march was over desert country, but the following day they again met the Rovuma, but did not cross it. They had taken a path which formed a chord to one of the river-bends, passing small villages of the Walolo, a tribe speaking the Makua language, and differing in little but the mark on the forehead from the main tribe to the south. They reached hills towards the end of the third day's march; these were clothed with bamboo jungles, but little water was found. Here one of the Africans, educated at Bombay, died. On the fourth and fifth days they seem to have crossed open grassy plains with trees; they were steadily making an ascent, as indicated by the coldness of the mornings.

"On the seventh day they were at Makarika, where they rested two days, and after eleven marches came to Mataka, a town of considerable size, the residence of a Chief, who has power over a large district and many people; these are of the Waiao tribe, the same whom we called Ajawa, on the Zambesi. This is a high mountainous country with fine scenery and abundant water. The streams passed had a south-east direction, or seemed to flow to the Niende, and one crossed on the ninth day's march from Ngomano was of considerable size.

"This region is well peopled, and has abundance of cattle, besides goats and fowls. While here Dr. Livingstone was well received by the Chief, presents were exchanged, and provisions obtained. In the short journey already accomplished, the Bombay sepoy had proved unequal to the fatigues and irregular supply of food; the cattle and camels employed to carry loads had died, seemingly from the Tsetse fly, and drilled sepoy were of no use to take their place; they were fatigued and useless. Here Dr. Livingstone discarded all, except the Havildar, who bravely stuck by him, and advanced while his men returned towards the coast, in company with a slave-caravan which passed that way, soon after Dr. Livingstone had left Mataka. An estimate of Dr. Livingstone's confidence in these men may be formed from the fact that his letters and despatches were entrusted to the chief Mataka to be given to the first caravan: these

important documents have not yet been received, although six of the sepoys have come in, and Arab caravans arrived at Quiloa. Great interest will attach to the recovery of these papers, as in them Dr. Livingstone would probably state whether he purposed again returning to Ngomano (where he had left some stores on advancing), after having settled the end of the Nyassa and its northern limits to the Tanganyika. I have little doubt myself that any idea he may have had of returning had, by this time, been abandoned; indeed, it seemed contrary to Dr. Livingstone's nature to retrace his steps, nor could he have done so without disorganising his now enfeebled expedition. His only chance of keeping the remainder together seems to have been to advance beyond the regions in which desertion was easy. Having been 15 days at Mataka his party advanced, still in a westerly course, the first day's march one of the Bombay educated negroes ran back, and returned to Zanzibar eventually with the sepoys.

"Eight days' march over hilly country took them to Makata, one day distant from the border of a lake; the chief Makata rules over a large district, extending to the waters of the lake. Whether this is the same man as the Makaka mentioned in Lieutenant-Colonel Rigby's despatch of the 15th July, 1860, relating to Dr. Roscher's murder near the Rovuma, I am unable to say; but think it extremely probable. In this case Dr. Roscher must have reached the lake further north than has been supposed, but no papers were recovered to decide with any certainty where the fatal event took place. At Makata's another Bombay educated boy deserted.

"The day following their arrival at the lake they obtained four canoes, and, embarking in the morning, were all landed on the opposite shore by midday. Comparing this water with parts of the Zanzibar Harbour, my informants, the Johanna men, estimate the width as nearly six miles, which, from the time taken to cross, seems under the truth; but it is to be remembered they are not explicit as to when they embarked. On this, however, they are decided, that water extended to the north as far as they could see, and they heard of no end in that direction. To the south it seemed still wider. They also stated that the canoes were propelled by means of poles, and paddles were seldom used. The water was not deep; the opposite shore was of white sand, with plains to the west, but no hills visible, although high mountains appeared to the south. The lake extended at this place north and south.

"That night they slept at a small village on the western shore, and, leaving the water behind, marched west to Kampunda, or, as they often pronounce it, Mapunda. The people of this place possess

only a few cattle (only a few cattle were seen in town), but they gave a goat to Dr. Livingstone, and he remained one day. One of the Zambesi boys, Wakotani by name, deserted here; and the Havildar, worn out by disease, which attacked him on crossing the Nyassa, lagged behind and was left. Dr. Livingstone's party was thus reduced to 20 men, all told; of these, however, very few knew how to handle firearms, and could be of no service in case of a determined attack by natives. They left Mapunda, and arrived at Marenga after two days' march over level land, journeying west. No hills were crossed, although mountains were seen to the south; but there was a small hill at Kampunda. After remaining a day at Marenga, they again followed a westerly course over smooth ground. Marenga, who was civil to the party, ferried them in canoes over a muddy channel or swamp, rather than river. Soon after this they passed Maksura, still keeping west, and slept one night in the jungle. They had been told that the Mavite were fighting in this part; but they had been so long near them, that Dr. Livingstone seemed not to regard it. This was to the men; but, no doubt, he was aware that suddenly he might find himself face to face with them, as happened to us on a former occasion on Lake Nyassa, not far south of this very place. The fatal attack occurred at 9 A.M. in the morning's march. As to the date, it is doubtful. If the data such as I have been able to elicit, from a mass of contradictory evidence, is to be relied on, it would be about the 15th of July; not before then, but possibly, if there had been stoppages, of which no account has been taken, as late as the end of that month. A great difficulty here occurs: for, on reckoning back from the date of arrival of the Johanna men at Zanzibar, we find a discrepancy of nearly a month unaccounted for. And whether this is to be intercalated before or after the fight, I am as yet quite unable to determine; but if the meeting with the Mavite and Dr. Livingstone's death did not happen in July, it must have happened in the following month. I am at present inclined to think it happened about the last week of July. The question of date must be held as far from being settled; but this in no way affects the more important part of the narrative. As I was saying, about 9 A.M. in the morning's march, they found themselves traversing a plain country covered with grass as high as a man's waist, and abounding in low bushes with forest-trees and dense wood at intervals, such, indeed, as is seen a little further south, where the country is known. Livingstone led the way, having next to him, as usual, the Zambesi boys and the Bombay educated Africans, while Moosa, the head of the Johanna men, drew up the rear. As Moosa is our only

authority for what happened at this time, I may state that he was about 50 yards behind Dr. Livingstone when the boys passed the word from the Doctor in front that the Mavite were seen a little distance off. On this he ran forward, having with him his loaded rifle. When he had reached within ten paces of Dr. Livingstone, the Mavite were near and charging, their heads dressed with feathers visible above the large Caffre shields of ox-hide. Their arms were spears and battle-axes. On seeing Dr. Livingstone and his boys with levelled muskets, they checked their charge for a moment, and came on with a hissing sound when they found they were not fired on. Dr. Livingstone then shot the foremost man; he dropped dead; the others fired, and, as the smoke cleared away, Moosa saw three men facing Dr. Livingstone. Moosa was at this time standing behind a tree, in order to fire. Seeing the Mavite suddenly so close, he appears to have been panic-stricken. Dr. Livingstone had emptied his gun, and was endeavouring to reload, when faced by these three Mavite, who cut him down with a blow from a battle-axe which severed the neck-bone, so that the head dropped forward and he fell instantly. What happened on the field after this is unknown. Moosa ran off, and having been behind probably was unseen, while the Mavite attacked those who were with the Doctor and had fired.

“Moosa in his flight met his men; they had already heard the firing a little way in front, and were prepared to throw down their loads and make off. This they now did, and ran to a distance, where they hid themselves in the bush. Near sunset they came out; and, desirous of seeing if any of the loads still remained, they stealthily approached the place. Finding nothing where they had thrown them down, and seeing no one, they became bolder and cautiously advanced, when they saw Dr. Livingstone's body stripped of all but the trousers, and presenting one wound in the back of the neck. They scraped a hole in the soil, and placed the body there, covering it over with earth. They did not stay longer; near Livingstone's corpse were the bodies of two of the boys, which they recognised in the dim light by the ragged trousers still on them. The corpses of two Mavite lay near, it might be 20 yards off, their shields by their sides, but spears and axes had been carried off. Nothing remained to bring away, the Mavite had taken all; the nine Johanna men who have come back saw two boys dead. One Johanna man and all the Bombay and Zambesi boys are missing; and there is little chance that any one of them ever returns, taking as truth the statements solemnly made by the Johanna man and his eight companions, who all declare that, although, with the exception

of Moosa, none saw Dr. Livingstone fall, yet they assisted afterwards in depositing the body in its shallow grave.

“I shall not now follow in detail the narrative of the return journey. Dr. Livingstone was gone; it has, therefore, little interest. It was only a gang of ignorant negroes, destitute of everything and fearing every man they saw, endeavouring first to avoid habitations, then joining a coast caravan, which they met after crossing the lake at Kampunda. On the way to the coast at Quiloa the party was suddenly attacked by a party of Mavite and dispersed. Every one fled, the Johanna men now for the second time; ivory and slaves were abandoned and left to the will of the dreaded marauders. No account is given by the Johanna men of their having crossed the Rovuma on the return journey; but they crossed some river-beds, at that time dry, with pools of water in them. No doubt one of these was the Rovuma, which could be little more than as described in the dry season before the junction of the Niende, its chief supply.

“Thus has ended what at one time promised to be an expedition rich in results, and we must again pause in the march of discovery, leaving the map of Africa a disconnected string of lakes, every one of which is incompletely surveyed. Beginning at the north, the Victoria Nyanza is known only at its north and south ends; the intermediate coast on the west side has not been seen, and the east is entirely hypothetical, beyond the simple fact that it must have limits in that direction. As to the Albert, but a small part is known, and, like the Tanganyika, its north and south ends are as yet a blank. The southern end, however, is now the only one of interest, on account of the possibility of its uniting with the Tanganyika, and thus moving the Nile sources far to the south, and proving the Portuguese who visited Cazembe to have been the first to reach them.

“I do not say that such a thing is probable; I believe it is not. I suspect, however, that Dr. Livingstone was satisfied the Nyassa did not extend far beyond where he crossed it, if, indeed, it was the Nyassa that he passed over. His first object and one of his chief aims was to determine the extent of the Nyassa northwards, and it is very improbable that he would push on into an unknown and decidedly dangerous land beyond it, leaving this important point unaccomplished. That it was the northern prolongation of the Nyassa I am decidedly inclined to believe: for, firstly, the general direction from Ngomano—which was west—would lead him there. It could be none of the southern crossings by which he traversed the lake, for indeed no part of the lake south of lat. 11° s. is shallow,

certainly nowhere could it be crossed in canoes propelled by long bamboos. On the western side, also, there are hills at all the crossings, except at Kota Kota, and there the lake is wide. I believe that Dr. Livingstone first came upon the lake nearer lat. 10° , where the lofty mountains which were seen by us further south, on both sides, have subsided. The precipitous rocky borders of the Nyassa, in lat. 11° , are too marked a feature to escape the observation of the most obtuse, and the Johanna men all speak of the land on both sides as flat, the shores sandy, and the water shallow.

"I find in my note-book, under date 7th October, 1861, when at the foot of the hills inhabited by the Mavite on the shore of Nyassa, the following entry:—'Sisia, Kondowe, Photo, Matete, Mapunda, Chisanga, N'karamba; places between this and the other side, keeping by the bank. Chikamba, the chief of Sisia, fights with the Azitu (another name for the Mavite). The lake ends at Photo Shingo and Matete. At Mapunda the lake is narrow.' Such was the information I collected regarding the lake when returning, after having explored and mapped 200 miles of its extent, but failed to reach the northern extremity, which seemed so near. I was told elsewhere that a river came from a marsh and joined the lake at the north, and also that there was a large river, the Ruvu. Mapunda was said to have cattle, and the lake to end, not at one place, but at the three above-named places, which were at the same time some distance apart.

"I am now inclined to believe that the Mapunda of this account is the Mapunda or Kampunda mentioned by Dr. Livingstone's Johanna men. We may yet obtain some information on questioning Arabs and natives of those parts. I have endeavoured and yet hope to find the native boy who was with Dr. Roscher at the time of his murder to the east of the lake; something, too, may be learned from Bombay, the head man of Speke's expedition, who is himself of the Wahiao tribe, and a native of the country on this side of the Mavite.

"You may rest assured that nothing will be left undone to elicit information by the Consul or myself. Full depositions will be sent home by the former, together with all other information, authentic or otherwise, we can obtain. We may say of Dr. Livingstone that his end came mercifully at last: few minutes seem to have elapsed between the first appearance of danger and the fatal blow.

"Let me close this very hurried letter, impressing once more on you that the information it contains is the result of an imperfect investigation; much has still to be elicited, much never will be

known. If I disbelieved the story, you know I would be the last to repeat it; but I do think that substantially, although not in detail, it is correct.

“JOHN KIRK.”

4. *Extracts from a Letter of Dr. KIRK to SIR RODERICK MURCHISON, dated the 19th December, 1866.*

“DR. LIVINGSTONE had told us, in despatches of the 18th May, that north of the Rovuma, beyond the confluence, the Mavite, those emigrant Zulus mentioned by us as seen to the north-west of Nyassa, and as having migrated from south of the Zambesi about forty years ago, were devastating the whole country. He remained some time with the chief of Ngomano, at the confluence of the Niende (or Loende) and the Rovuma. Dr. Livingstone's predecessors on this route were the lamented young German, Dr. Albrecht Roscher, murdered by the people between the Rovuma and the Lake, and the late Baron von der Decken, who was driven back and since murdered farther north. But Livingstone has always passed where others failed, and he did so here. He advanced from Ngomano, first through level forest-land, thinly peopled, and afterwards through a mountainous region inhabited by the Waiao and Makua tribes, among whom he found good treatment, instead of treachery. But his party at the same time became thinner. The Bombay Marines collapsed, all but the Havildar, who followed his chief when the rest of his men returned to the coast. Some of the educated natives also absconded. He went on with the remaining Africans, the Johanna men, and the Havildar. The country he was in possessed a cool climate, and was peopled by scattered villagers, ruled by chiefs of considerable power, rich in cattle.

“He arrived on the eastern shore of Nyassa, at a place where the lake seems to have been narrow, and, what is more wonderful, shallow; but take native tales for what they may be worth. It is commonly asserted by the survivors that they were taken across in canoes propelled chiefly by means of long bamboos, and that, embarking in the morning, they had all crossed by noon. The shore on both sides was flat, but hills appeared to the south. I believe this was a little to the north of where I have placed the end of the lake in the map I communicated to the Royal Geographical Society, and which is published in the ‘Journal,’ volume xxxv. (I believe that this shallow water crossed by Livingstone was the river I heard of, which is said to come from a marsh.)

“Livingstone's first object, we know, was to determine the northern

limits of Lake Nyassa. I conclude that he had satisfied himself of this point at once, for had he not, most assuredly he would have taken canoes and followed up the water to the north. Certainly he would not have turned his back upon it, and advanced beyond into what he well knew to be a dangerous region, to encounter or chance a meeting with those savages who had once before turned his route.

“My impression is, he had satisfied himself that this shallow (if shallow it be) continuation of Nyassa did not reach far, that it was of no importance, and therefore probably had no current. He crossed it with the intention, as he told us, of pushing on to Tanganyika from Nyassa, if all went well. The desertion of some men, and the death or invaliding of others, had so weakened his party that he must have seen that a return to the Rovuma confluence would have closed the present expedition. He knew that his chance was, having got the men, to keep them marching on further from home and the hope of a successful flight.

“On the west of the lake the villagers were civil, and warned him of the Mavite in front, with whom they were at war. These seem to be the same Mavite who send out marauding expeditions to the south of Nyassa and eastward, even to within eight days’ march of Quiloa. Their language is still Zulu, although the blood is mixed by intermingling with the captive races they have subdued. From Mapunda, on the west side of the narrow portion of the lake, they marched to Marenga, two days’ journey distant. Marenga was civil, and ferried the party over a marshy tract of mud, which they might have gone round by a *détour*. The outlying villagers warned them that the Mavite were out, but Dr. Livingstone heeded not what they said; indeed, since leaving Ngomano he had been marching in a land full of fear and dread, and no doubt had come to look on the Mavite as few and far between, and the chance of meeting with them as small; or possibly he had determined to go straight at their headquarters, and thus try to reach their chief. When he had journeyed a day and a half from Marenga, about 9 A.M. the party was suddenly attacked in plain ground, covered with grass three feet high, and scattered jungle of forest and bush. Just at this time they seem to have been in a thicket, so that the Johanna men, at a little distance behind, did not see Dr. Livingstone and the boys in front. Moosa, the head man of the Johanna party, did, and witnessed the scene from behind a tree. Dr. Livingstone, who had just emptied his gun, endeavoured to re-load, while three Mavite appeared close on him, and one of them cut him down with one blow of an axe, which pierced the neck, and caused instant death. As he sank, the head

dropped forward. Moosa ran off, and it is very doubtful, on his own showing, whether the enemy saw him. Meeting the others, who had been warned by the shots, they joined, and all fled to a distance, where they remained concealed until evening, when, returning to seek for the loads they had cast down, and not finding them, they advanced cautiously, and saw the body of their leader where it had fallen, with but one wound in the back of the neck; the upper clothes had been stripped, and everything carried off.

"We are at the mercy of our informants, but they tell a tale such as I believe, for had they invented it they would have made a story more to their credit. Nothing has come to us, not a relic or thing to show, and none but Johanna men have returned; yet I think their position behind, and the fact of their escaping before being seen, may account for this.

"I fear the tale is true, much as I could wish to think it was otherwise.

"You may imagine how I feel, being the first to communicate the sad news regarding my leader, whom I had known, I may say, far more intimately during the Zambesi expedition than any other member of it. On all occasions I was his companion, when there was rough work to do. I could never wish a better leader; and now I often think what might have been the result had there been some one near him to use his rifle with a steady hand, and not stay cowering to see the murder from behind a tree, as did the head Johanna man; true, he could not use his gun, and I believe had no ammunition. I must close, and I wish, in doing so, it were with the hope that all is false; it may be so, I hope indeed it is, but confess it is hope against hope all the while.

"JOHN KIRK."

5. *Results of the Enquiry at Quiloa.*

The following Despatch from Dr. Seward and Letter from Dr. Kirk relate the results of their journey of enquiry to Quiloa:—

"MY LORD,

"Zanzibar, 26th Jan., 1867.

"I have the honour to inform you that, in pursuance of an intention expressed in my last despatch concerning the asserted death of Dr. Livingstone, I have personally made inquiries amongst the traders of Keelwa and Kivingi, and have gathered information there which tends to throw discredit on the statement of the Johanna-men, who allege that they saw their leader dead.

"The evidence of the Nyassa traders strengthens the suspicion that these men abandoned the traveller when he was about to

traverse a Mavite-haunted district, and, for ought they know to the contrary, Dr. Livingstone may yet be alive.

"I purpose sending details by the next mail, and have the honour, &c.,

(Signed) "G. EDWIN SEWARD."

"MY DEAR SIR RODERICK,

"Zanzibar, 28th Jan., 1867.

"We have visited the once famous Quiloa, now a deserted port, with a few wattle-and-daub houses, an Arab fort falling to pieces, and the last remains of the old Portuguese defences. The trade of Quiloa has gone to Kivingi, about 7 miles further north, on the coast where, behind an intricate barrier of reefs, the slave-trade may safely be carried on; for Quiloa is the chief resort of the Nyassa caravans, whose business is in slaves.

"These Arabs and Sowaheli traders have passed even from Zanzibar to Loanda (on the western coast of Africa), and traversed the Lake regions in every direction; but their business is not geography, and it is their interest to give as little information as possible: besides they cannot, if they would, describe a new land. They go for ivory and slaves, and care nothing about lakes and rivers, unless they stand in their way and delay progress. Some caravans follow the same route as that by which Livingstone went to the lake: they even cross it, or rather a marshy creek, at the northern end, where he did; but they avoid the land of the Mavite. From what I know of the lake they cannot pass south; we may conclude that their route is to the north-west, just in the direction required to reach the Tanganyika.

"We may consider it now settled that the Nyassa ends in the tenth degree of south latitude; for Livingstone would not have left that point doubtful: where he crossed in canoes [the lake] was very shallow and narrow; the country was level and marshy, and seemed just like the region to the south, where it ends, and where, yearly with the rise of water in the lake, considerable tracts are flooded. Had Livingstone suspected that this marshy creek came from another lake he would have followed it up. Instead of this he set out seemingly for the rivers which flow to Cazembe, and probably to the Tanganyika.

"From the little heard at Quiloa I can find nothing to encourage us in hope. The story has been confirmed in so far that Livingstone crossed the lake; but if the tale be true, we never shall hear more. It would be easy to send a native to the lake; but no one can pass among the Mavite. We may still hope for letters and even portions

of diary, although I suspect the Arabs have destroyed them, fearing disclosures regarding their atrocities, which are well described by Baker.

“The Lake regions cannot possibly be left as they are: the decisive journey has yet to be accomplished. We know that lakes exist, and a few points on their shores have been seen; but of the Lake regions we know little indeed, when we know not whether the Tanganyika discharges its waters to the north, south, or west. We know not where the Albert Lake extends; the Victoria Nyanza is not the lake figured on the map. Whoever traverses the chain of lakes will find fame with much greater ease than those pioneers who reached their shores and first demonstrated their existence. I believe the best plan would be to traverse Unyamwezi and remain on Tanganyika, which can be examined by boats built of native timber, and native African carpenters may easily be found. The road thither is easy, although long, and at Kazé a dépôt may be formed. The Nyassa Lake I consider disposed of, and a boat on Tanganyika could settle whether the Cazembé streams enter at the south.

“To Sir Roderick Murchison, Bart.”

“J. KIRK.”

The PRESIDENT said he could not, as an old and dear friend of Livingstone, avoid clinging to the hope that he was still alive; and that he might be at this very moment on that Lake Tanganyika which he had gone out to explore. If he only succeeded in passing the narrow tract inhabited by the warlike Mavite, he would be comparatively safe, and so far from the lines of communication that it would be impossible to hear of him for many months, except by the accident of some Arab trader bringing down the intelligence to the coast. It was on this account, and trusting to the last despatch from our Consul, officially reporting what he had heard from the Arab traders as to the untruthfulness of the Johanna men, that he thought there might still be some hopes—he would not say very sanguine hopes—that their illustrious friend was not dead. At all events, they ought, before they decided, to have better evidence than that of these men, all belonging to one tribe, and not, like the negro Africans, attached to Livingstone, but only his baggage-bearers, and in the rear, and who were described as a cowardly race. If any of these negroes, several of whom were said to have escaped, had returned and told the story, they might then believe it. And why should they not have returned, if their leader was dead, as well as the Johanna men? He thought it was their duty to cling to the hope as long as they could, until some more decisive evidence was obtained. Passing from this subject, he hoped the discussion would turn upon the general condition of our geographical knowledge of Africa at this moment, as compared with what was known before the discoveries of Burton and Speke. He had in his hand a document drawn up by Mr. Findlay, in which four stages in our knowledge of the lakes were represented. First, there was the discovery of the Tanganyika Lake by Burton and Speke; then, the discovery of Victoria Nyanza by Speke, and the great journey of Speke and Grant; and, finally, the discovery of the Albert Nyanza by Sir Samuel Baker—a discovery which had led to the idea of Tanganyika Lake having a communication with the Albert Nyanza. The great object of Livingstone's journey was to reach the northern end of Tanganyika, and solve that

problem completely. In hoping most ardently that Livingstone had escaped, they would see what a wide field of exploration was open to him. It was upon this feature of the question that he wished the discussion to turn.

Sir SAMUEL BAKER said the news of Livingstone's death lay so heavily upon his mind that he could not speak of the lake system of Africa without first expressing his opinion respecting the fate of the great traveller. From his personal experience in Africa, of nearly five years, he was compelled to differ in opinion from the President. For his part he felt perfectly certain, from the evidence that had been laid before them, that they should see Livingstone's face no more. To him, who knew the native character, which was the same—exceedingly brutal and savage—throughout Africa, it was no wonder that Livingstone was killed: it was only a wonder that one man out of a hundred ever returned from that abominable country. The death of Livingstone had given a check to African exploration, and he felt perfectly convinced that for a long time to come the centre of Africa would be closed to us. Although we had done much, still we knew but little. We knew that lakes existed, but we had not been able to explore well any one of them. We had reached certain lakes, still their extent was perfectly vague. He felt certain that no individual enterprise would ever open Africa, except to this extent,—that an unfortunate traveller, weary and toilworn, might return to the Geographical Society and state with all humility the little that he had done. With regard to Livingstone, he was perfectly convinced that, as Baron von der Decken and Dr. Roscher had been killed, and Mrs. Livingstone had left her bones in Africa, so Livingstone had fallen a sacrifice; and although they could not erect a monument to his memory on the place where he fell, yet his name would live in their hearts as that of a man who had nobly done his duty. Returning to the lake system of Africa, the only question of importance at the present moment was whether the Tanganyika Lake were really the head-water of the Nile, by means of a communication with the Albert Nyanza. He did not share in the opinion of Mr. Findlay on this subject. It was impossible to know anything that existed in Central Africa until we explored it personally. There were people in England who talked about the source of the Nile and the Niger and other rivers, who would have more hesitation in expressing an opinion upon the sources of the Severn and the Thames. His own opinion was, from the altitudes he took, that there is a ridge on the equator in Africa, about 4000 feet above the level of the sea, with a northern and southern watershed; and that the great rivers of Africa have their source in these great high lands. To the north there will be the Nile, which flows into the Mediterranean; to the west the Niger flowing into the Atlantic; and to the south there will be the Zambesi on one side, and the Congo on the other. With regard to the supposed connection between the Tanganyika and the Albert Nyanza, they could adduce proofs against the theory by comparing the altitudes of the two lakes. On the north the Albert Nyanza is 2700 feet above the sea; on the south the Tanganyika, according to the altitude given by Burton and Speke, is only 1840 feet: therefore, if those altitudes were correct, the question was settled against the Tanganyika having any connection with the Albert Nyanza. On the other hand, he must confess that he shared very much the opinion of Mr. Findlay, that the altitude of Lake Tanganyika, taken with a bad thermometer, could not be depended upon. As the question rested in that uncertain state, and Speke and Livingstone and all the travellers had done their best, he would suggest that there was plenty of room for those who adhered to theories to carry them out by personal investigation; and he hoped that not only would there be an expedition to discover what had become of Livingstone, but expeditions also to ascertain the truth of this theory as to the connection between the two lakes. He should only be too happy to take charge of one of them.

The PRESIDENT observed that there were some points connected with our knowledge of the African interior which Sir Samuel Baker had not alluded to. It was well known to geographers that, far to the south of the country which Sir Samuel Baker had explored, Portuguese subjects had traversed those regions more than once or twice, and they had been traversed besides by numerous native traders. He wanted to recall the attention of the meeting to the possibility of Livingstone having got upon one of those routes which the Portuguese followed, either between Tete on the Zambesi and Cazembe, or the slave-route between Quiloa and the far interior. Now if Livingstone be once far advanced on these routes, what difficulty was there in his going forward in safety to Cazembe? They had no evidence to rest upon, he repeated, but that of the Johanna men, and, until they had better evidence, he never would believe that Livingstone was dead. He would not, therefore, put the Society into mourning for the death of Livingstone. He would still cling to those rays of hope which the last despatch from Dr. Seward at Zanzibar justified.

Mr. J. CRAWFURD was sorry he felt obliged to agree with Sir Samuel Baker and to differ from the President. It would have been very satisfactory if they had had the actual depositions of these Johanna people. They were said to be cowardly, but they were not more cowardly than the Sepoys, who ran away long before the massacre occurred. They were said to be liars, but there were many of the same description in their part of the world. Seventy years ago, Sir William Jones gave a very favourable description of these people in the 'Asiatic Transactions.' They would observe that the last despatch, in which was expressed the hope that Livingstone was alive, was by Dr. Seward, the Acting Resident at Zanzibar. Now, Dr. Kirk, a friend of Livingstone, a man who had travelled in the interior, and who was better able to judge than Dr. Seward, expressed no hope whatever in his letter of the very same date.

Mr. HORACE WALLER said he was with Dr. Livingstone many months in Africa on the River Shiré, and knew many of these people whose names had been mentioned to the meeting. He had met with men of the Mavite tribe. They are a terror to the Portuguese; and although Dr. Kirk imagined that they crossed to the northward of the Zambesi forty years ago, he was led to believe that this particular band, who were killing everybody right and left throughout the country, only crossed in 1856. It had been stated in the public papers that Dr. Livingstone, before he struck the lake, had been in collision with the slave-dealers. He had the pleasure of telling them, from letters he had received within the last few days from Zanzibar, that Livingstone had not been in collision at all with the slave-dealers. As to Ali Moosa, he knew him very well; he was the head of these twelve Johanna men; but he was thoroughly untruthful, and would lie through thick and thin whenever it answered his purpose. Moosa was a man he would not place confidence in at all. But Dr. Kirk had been there: he knew Moosa, and he knew all the men; and he was the most likely man of all who had been upon that coast to come to a sound conclusion. He must say he placed faith in the sagacity of Dr. Kirk, and whatever opinion Dr. Kirk entertained with regard to the fate of Livingstone he must entertain. He would add, that one of the two African boys supposed to have fallen with Livingstone was reported to be in safety, having left the expedition when it reached the shores of Nyassa. These boys, in common with many others who were now at the Cape, were amongst those negroes who had been liberated by Livingstone from the slave-dealers in 1861, and they had always shown the greatest regard and affection for the Doctor. He had received a letter from Zanzibar within the last few days, telling him that one of these boys, in crossing the north end of Lake Nyassa, had met with some of his tribe and with one of his sisters—from whom he had been separated since 1860—and the boy remained behind. This was about five days prior to the murder. The other boy, of whose bravery he could personally speak, fell fighting

by his master's side. Ali Moosa, when on his way back from the spot where Livingstone was killed, saw this boy again on the shores of the lake. Now, it had occurred to him that if any inquiry was to be set on foot, this boy would be a most valuable help, for he spoke and wrote English, and respected English people. With regard to the Mavite, they were a lawless set; but he doubted whether they would be antagonistic to the incoming of white strangers, because they are not in league with slave-dealers at all. When Livingstone met with them on his previous journey, they were the terror of the whole country; but, upon his men speaking to them in the Zulu language, they made off and did not molest him. Therefore, he could not conceive what object these men would have in attacking Livingstone, unless they had been bought over by the slave-dealers or influenced by them. Sir Samuel Baker had indulged in a gloomy foreboding that, with the fall of Livingstone, the interior of Africa would be closed. For his part he had no fear that Africa would remain the *terra incognita* it had been in past ages. Let them—and it was the moral to the story—determine to deal with what was the real curse of that country, and the real danger to exploration. It was the slave-trade. He had lived for three or four years in the midst of the most terrible scenes that it was possible to imagine. At the present moment there was a slave-trade going on there that was little known. Colonel Rigby and Colonel Playfair had told him that 25,000 slaves passed through Zanzibar in the course of the year. With the slave-trade thus flourishing, they could imagine what a difficult task it was for the traveller to pass through the country. It was this difficulty which Livingstone had dogging his steps and thwarting his brave efforts; and, if he has fallen, he has fallen in facing an enemy that he has always faced, and which he struck when he first knew the Zambesi.

Captain SHEPARD OSBORN said he thought the arguments used by Sir Samuel Baker against theorising with regard to the lakes of Central Africa, were perfectly applicable to the question of whether Livingstone were alive or dead. Our data in both cases were very imperfect. The fate of Livingstone at this moment was remarkably analogous to that of Franklin in 1848. Franklin was missing, and there were plenty of people ready to come forward and produce indubitable proofs that Franklin had perished close to the threshold of his work. He and others doubted it strongly; but so fiercely was the question agitated that some of the best and soundest authorities in this country were disposed to relinquish the idea of Franklin's pushing forward then, as he believed poor Livingstone might be pushing forward now. He held that they, as members of the Geographical Society, should act upon the broad principle that, until they had positive proof of the death of Livingstone, or any other explorer, it was their duty not to cease their efforts to rescue them. If it were easy for the slave-trader and the missionary to traverse Africa, he maintained that other men could penetrate to Lucenda and see if Livingstone had left that place in safety, and bring back any papers he might have left there. If Livingstone had fallen, he believed that the efforts made to solve the mystery of his death would lead in all probability to the clearing up of the mystery of the African Lake regions, just as the problem of the northern Polar regions had been solved in the search for Franklin.

Mr. BAINES said, as one who had been with Livingstone eighteen months in Africa, he wished to bear testimony to his perseverance and ability as an explorer. With regard to his reported death, he himself had been reported dead, and in 1860 or 1861 it was stated that Dr. Livingstone had been killed; but the editor of the Cape paper added very sensibly that Dr. Meller, who brought down the letters had previously been reported dead, and had come out alive. Mr. Baines said he did not give up hope; at the same time he had very great fear, founded on the conclusion Dr. Kirk had come to, who would not be easily deceived by the natives.

The PRESIDENT, in concluding the discussion, said he was glad to find that

gentlemen well acquainted with parts of the region recently explored, had, as well as himself, a hope that Livingstone might be still alive. Although it was a ray of hope only, they would, he was sure, agree with him that an expedition should be sent out to clear up this painful question. Until that was done, he (the President) should remain in doubt as to the death of the great explorer.

ADDITIONAL NOTICES.

(Printed by order of Council.)

1. *Notes on Rangoon.*

[Extract of a Letter from Mr. ALEXANDER BROWN to Mr. JOHN FLEMING, dated Rangoon, 15th Feb., 1867.]

"It would appear that Moulmein has been going down the hill in importance, or at least that Rangoon is so fast advancing in prosperity and importance that Moulmein has already become quite subsidiary to it. The position and accessories of the two ports quite explain this. Rangoon is on a magnificent river, with no difficulties of navigation, communicating direct with the frontier of British Burmah, and thence with the capital and most important provinces of Burmah Proper. It is the outlet, in fact, of the whole country: its rise has been most remarkable. In 1852 it was nothing, and now it is a large and flourishing city with 60,000 to 70,000 inhabitants, and is still steadily extending. It is the head-quarters of the rice-trade (Bassein being so near, only some two or three days' journey through the creeks, can easily be worked as a subsidiary to it), and must be the outlet of all the produce of Burmah Proper, when it comes in course of time to be developed. At present there is a temporary check to the prosperity of Burmah generally, owing to the unsatisfactory state of matters in the King's territory (or Burmah Proper). His oppressions, extortions, and cruelties, have reached such a point as thoroughly to incense the people against him. There has already been a serious rebellion, and though it has been for the time quelled, yet the universal opinion is that things are rapidly working up towards another and more serious outbreak; and it seems more than probable that ere long our interference, and probably the annexation of the whole country, may become an imperative necessity. It would appear that the Burmese would hail such a result with delight, as they can contrast the state of matters in British Burmah with that in Upper Burmah. They are a most intelligent race of people, and what little one sees of them on a short visit like mine, impresses one most favourably with them in contrast with the natives of India. Though Bhoddists, they seem utterly without the prejudices, or at least the narrowness of mind, of our natives. They have a complete national system of education, every boy being obliged by their law to reside for three years in a kyoung, or religious house, where they serve the poonghies or priests, and are educated by them in reading, writing, and the elements of arithmetic, as well as in religious knowledge. The system is a very wise one. The priests, of whom there are vast numbers, live in the kyoungs; they are celibates, and I believe, as a rule, very chaste. They never handle money, and are supposed never to see it. Each morning they, and the boys in their charge, go round the village, and at each house get a portion of rice and other food ready cooked, on which they and the boys live.

The boys are thus boarded for three years, free of direct cost to their parents, at the expense of the whole community, and both acquire habits of restraint and submission to authority, which could not possibly be the case at the same age at home, and obtain a simple vernacular education sufficient to carry them through life. The females are entirely uneducated, and it is said to be as hard to find a woman who can read or write in Burmah, as a man who cannot do both. Nevertheless the women seem to be fitted by nature for keeping their own place in society. They are excellent merchants, and they say a great many of the bargains for rice and other produce are effected by them. They can keep their husbands in order, and slipper them when they misbehave; a curious example of which I saw in passing through a village not far from Moulmein. A Burmese girl, who lived with a Mahomedan from India as his wife (having cause to be jealous), dragged him out into the street, seized him by the turban, took it off, stripped him of what money he had, gave him a good beating with her fists and her slippers, proclaiming most vociferously his fault to all the bystanders, not one of whom interfered; the miserable wretch taking it all as if it were his due. I was told such scenes were not uncommon.

"The Burmese have many of the characteristics of the Chinese, are ingenious and enterprising, though lazy. They have much independence of spirit, and nearly all the menial labour in British Burmah is performed by Coolies from India. Altogether they are a race well calculated, under good government, to make far more of a country than ever the Hindoos could; and were this only secured to Upper Burmah, there must be a great future before the country, and Rangoon could not fail rapidly to become a place of the utmost importance.

"Moulmein, on the other hand, has many drawbacks; the approach to the port is very difficult and dangerous. The River Salween, though a splendid stream, is unnavigable beyond about a hundred miles, on account of a serious barrier of rapids. There is little or no rice-trade, and nothing, in fact, to depend upon but the teak-timber trade. Owing to the extremely depressed state of matters with regard to teak, the place is for the present almost dead, and merchants, who formerly used to consider it their head-quarters, have now merely a subsidiary agency there."

2. *Exploration of the Endeavour River, Cape York Peninsula, Australia.*

By JOHN JARDINE, Esq., Police Magistrate, Somerset, Cape York.

ON the morning of 27th September, 1865, accompanied by my son and three of the officers of H.M.S.S. *Salamander*, having by the courtesy of Acting-Commander Yonge been furnished with a boat and crew, I entered the Endeavour River, and proceeded with the tide for 3 miles, where the mangroves which cover the low country round the mouth cease, and the river takes a decided form, flowing in a width of 400 yards, between moderately high banks of a reddish clay, overlaid by a layer of light vegetable mould. The country on either side lightly timbered with bloodwood, Moreton Bay ash, &c.

Following the course upwards for about 15 miles further, the description of the river as given in the Admiralty chart was found to be correct in all respects, with the exception that fresh water was not met with till the head of the tide was reached—a distance of $3\frac{1}{2}$ miles further than the survey goes. This may readily be accounted for by the unusual dryness of the season, evidences of which were everywhere visible. At this last point the channel becomes very narrow, with a depth of water of about 5 feet, and it terminates abruptly in a small basin below a bar of slate rock.

To this point the general course of the river was N.E. by N., when it turns to N. by W., and continues in that direction to a remarkable gap in the Main Coast Range in which the river appears to take its rise. The range here is

17 miles distant in a direct line from Grassy Hill, at the entrance of the river.

I followed the upward course of the river for about 2 miles above the tide. The stream had ceased to run, but there was abundance of water in large rocky pools. The banks on either side were high, and the country level, of red soil, well grassed, and moderately timbered. I saw no scrub, except on the small alluvial flats by the river-side. These were covered with vine-scrub usually seen in such situations. The trees were large white gum, melaleuca, silk-cotton, white cedar, Moreton Bay chesnut, and coral-tree growing to a very large size. Plenty of game was seen, and a small party of natives, who made off as soon as they saw us. I estimate the distance travelled to be, by the river, 21 miles, and in a direct line, 12 miles from the mouth of the river.

On reaching the boat at dusk it was found that one of the crew had received a wound from the accidental discharge of a rifle, so severe as to make it necessary to return to the ship without delay; and it was reached before daylight next morning.

A boat was again kindly placed at my disposal by Commander Yonge. I did not, however, consider it necessary to resume my examination of the upper part of the Endeavour, but proceeded to search the land in the neighbourhood of the entrance for fresh water. Landing on the south side, under Grassy Hill, accompanied by my son and Lieutenant Edwin, R.N., I proceeded along the base of the range, ending in Mount Cook, and found all the water-courses dry, with the exception of one marked "fresh" in the chart. In that a small quantity of water, putrid, and quite unfit to drink, remained. I ascended a prominent point in the range, and had a view of the river winding through a broad valley, the country consisting of lightly timbered low ridges. The soil of the neighbourhood of Mount Cook consists chiefly of poor clay; the ridges are strewn thickly with broken clayey slate. The timber is chiefly stringy-bark and bloodwood. Mount Cook itself is of granite formation.

As there was no water to be found on the south side, we crossed to the north of the river, and at the head of a watercourse which runs into the sea at the foot of Mount Yonge, about 2 miles distant from the beach, good pools of fresh water were discovered. This was the only fresh water I could find in the neighbourhood, though doubtless there was more, as the natives were numerous.

The whole of the point formed between the sea-beach and the north arm of the Endeavour, appears to consist of mangrove-swamp and sandhills, covered with bent-grass and small brushwood, chiefly banksia: a few small trees of sandalwood were met with here; but I did not succeed in finding any further up the river, or of a sufficient size for trade.

It is to be regretted that the scarcity of water near the mouth of the Endeavour River forms so strong an obstacle to its occupation as a settlement. It must, however, be borne in mind that the present has been a most unusually dry season. Although the country in the immediate neighbourhood of the port is by no means inviting in quality, still the upper part of the Endeavour Valley, commencing, say, at a distance of 3 miles from the coast, is of a much better description, and well adapted for grazing cattle. The upper part of the valley is also well watered.

The port, though small, is convenient, and has the advantage of an entrance with 10 feet of water at low tide. There is also a depth of water at the foot of Grassy Hill, sufficient for a vessel of considerable size to lie within a few yards of the shore. I am informed by the master of H.M.S.S. *Salamander*, that, on examination, he finds no alteration has taken place in the soundings at the entrance of the river, as given in the Admiralty chart.

I have carefully examined the coast from Rockingham Bay to Somerset, and can see no other place which offers the appearance of being at all suitable

for settlement, except the Endeavour River. With all its disadvantages, its position—nearly central between the two places before named—and being so near to the tracks of ships passing by the inner route, must, I think, give it a preference. Its situation, also, in respect to the country, reputed to be pasturable, on the heads of the Mitchell River, and also near the Kennedy River and Princess Charlotte Bay, would be convenient.

Having read the evidence given before the committee for the steam postal communication through Torres Straits, it appears to me that if it is the determination of the Queensland Government to establish a line by the inner passage, it will be indispensable that marks and beacons, and perhaps lights, should be placed at many points along the route. It will, of course, be necessary that such marks and beacons should have continual attention, to see that they are not displaced or destroyed. This duty could be best performed from stations along the coast; and, as the most intricate part of the navigation of the inner passage, and that most requiring marking, lies between the Endeavour River and Booby Island—a distance of 400 miles—I think that no two more convenient places than the Endeavour and Somerset could in the first instance be selected for such stations.

I would here suggest that much valuable information on the subjects connected with the navigation inside the Great Barrier Reef might be obtained from Mr. C. Edwards, of Sydney, who, for a number of years past, has been, and still is, engaged in bêche-de-mer fishing on the islands and coral-banks of these seas, and than whom, I believe, no one is better acquainted with the tides, currents, winds, and all matters affecting their navigation; and also from Mr. Hayman, master of the *Salamander*, who has had the experience of several passages between Brisbane and Somerset.

Situated about 6 miles to the southward of the Endeavour River is the entrance of another stream, an opportunity of examining which will be afforded me on the return of the *Salamander*, and the result of which I will communicate.

3. *Exploration of Annan and Esk Rivers, near Cape York, Australia.* By JOHN JARDINE, Esq., Police Magistrate, Somerset, Cape York.

On the 11th November, 1865, the *Salamander* anchored off an opening in the coast formed by the entrance of two streams about midway between Monkhouse and Walker points. The afternoon of the same day was occupied by me in examining the southern stream. At the entrance it had a width of 100 yards. After following what appeared to be the main channel for upwards of four miles through extensive mangrove-flats, and passing the entrances of numerous minor branches, joining on each side, the passage became so narrow that the oars touched the bushes on either bank; I therefore returned to the entrance, when, on ascending a peaked hill of considerable height, and which I have marked as "Quartz Peak," from the large blocks of quartz which form its top, a good view was obtained of the course of the southern stream, which I have marked the Esk. The upper portion appeared to drain an open valley of considerable extent, and extending in a north-westerly direction.

The northern stream—which I should wish to name the Annan—was also distinctly seen running for a long distance to the north-eastward through a wide valley, and apparently taking its rise in the main coast range. This river, although marked in the chart "rivulet," is fully entitled to the greater term, while the country through which it ran presented so favourable an appearance that I determined on examining it, as far as possible, on the following day. Accordingly, a boat and crew having been kindly placed at my disposal by

Commander Yonge, R.N., accompanied by my son, I entered the river at low water, and went up with the tide.

At the entrance the river is half a mile wide, gradually lessening for 3 miles to 300 yards. In the next 2 miles it narrows to 100 yards; and for the next 6 miles has an average width of 60 yards. The shallowest water is 5 to 6 feet. The general course for 10 miles is N.E. by N., when a spur from the main range, forming the watershed between this river and the Endeavour, turns it to the north-west, in which direction the features of the country lead me to believe that it continues to its source.

As it was late in the day I turned back, after having followed the course of the river 12 miles, or in a direct line from the sea 6 miles. The character of the country on the banks of this river fully realized the expectation formed on the view of it from Quartz Peak. The subsoil is generally a dark red clay, with a considerable depth of light vegetable mould about it. The grass and herbage is good. The timber chiefly blood-wood and white box. Small alluvial flats by the river are covered with the usual vine-scrub. On the left bank, about half a mile from the river, is a watercourse with good water-holes, evidently permanent, as even in this dry season they were well filled, and contained quantities of fish. The usual water-mark was at least 6 feet above the present level. The ship was reached at dusk.

On the next day, I examined the north side of the entrance for fresh water, which was found in permanent pools at a short distance from the beach, about midway between the entrance and Monkhouse Point. The land here is light and sandy, but well grassed. The general formation is granitic, with occasionally large masses of quartz.

An examination of the entrance by the Master of the *Salamander* proved it to be intricate, accessible only by a narrow and winding channel, with from 4 to 6 feet of water at low tide. Inside the entrance, however, there is deep water, which continues for some miles up the river. Had the Annan the advantages of the Endeavour at its entrance, I should give it a preference as a site for a settlement; as it is, however, it cannot be recommended as a port.



PROCEEDINGS
OF
THE ROYAL GEOGRAPHICAL SOCIETY.

[ISSUED JULY 23RD, 1867.]

SESSION 1866-67.

Tenth Meeting, April 8th, 1867.

SIR RODERICK I. MURCHISON, BART., K.C.B., PRESIDENT, in
the Chair.

PRESENTATIONS.—*Rev. S. M. Mayhew; E. Story, Esq.*

ELECTIONS.—*Alexander Beazeley, Esq., C.E.; Michael Beazeley, Esq., C.E.; Colonel R. de Salis, C.B.; James Harvey, Esq.; John Schofield Mayson; John Ramsay, Esq.; Thomas Stephen Whitaker, Esq.; William Henry Wills, Esq.,* Justice of the Peace for City and County of Bristol.

ACCESSIONS TO THE LIBRARY SINCE THE LAST MEETING.—‘*Inilah Kitab, Taman-wandji namanja, Jah itu Dikompol oleh J. G. F. Riedel.*’ ‘*Inilah pintu Gerbang pengatahuwan itu oleh J. G. F. Riedel.*’ ‘*De Eedaflegging bij de Tooe-ven-Boela in de Minahasa.*’ *With Plates.* Door J. G. F. Riedel. ‘*De Uitbarsling awoeh-Taverna in 1856,*’ door J. G. F. Riedel. All presented by the Author. ‘*Mauritius, or the Isle of France; being an Account of the Island, its History, Geography, Products and Inhabitants,*’ by the Rev. F. P. Flemyng, M.A., F.R.G.S. Donor, the Author. ‘*Reliquiæ Aquitanicæ; being contributions to the Archæology and Palæontology of Perigord and the adjoining Provinces of Southern France,*’ by Edouard Lartet and Henry Christy. 4th Part. Donors, the Executors of the late Henry Christy, Esq. ‘*Die Preussische Expedition nach Ost Asien.*’ Purchased. ‘*The Bahamas, 1864,*’ by Governor Watson. Donor, the Author. ‘*Interoceanic Railroads and Canals.*’ Donor, the U.S. Navy Department. ‘*The Official Gazette of the Institution of Hydronomical and Nautical Engineers.*’ Donor, the Registrar.

ACCESSIONS TO MAP-ROOM.—Africa: Map of Angola, on 2 sheets,

published by the Portuguese Government. Presented by Commodore E. Wilmot, C.B. Five Maps, on 11 sheets, presented by Professor P. Chaix : viz., Map of the Canton of Genève, on 4 sheets, by General H. Dufour. Two maps of the Baltic provinces of Russia ; viz., Courland, Livonia, and Esthonia, showing the heights and water-communication, accompanied with three sectional plans, by Dr. Karl Rathlef. Map of Arabia, showing Dr. Palgrave's route, by P. Chaix. Map of the Holy Land, with letter-press. Map showing the various explorations in Smith Sound, from that of Bylot and Baffin in 1616, to Dr. Hayes in 1861. Presented by Dr. Petermann. South America : a map showing the Argentine Railway from Rosario to Cordoba, by L. M. Laberge, C.E.

Before commencing the business of the evening, the PRESIDENT announced that the Council of the Society had drawn up the following Resolutions with regard to Dr. Livingstone :—

“The Council are of opinion that it is highly desirable that a tentative expedition or expeditions should proceed, whether from Zanzibar to the head of Lake Nyassa, or from the Zambesi to that point, with a view to ascertaining the fate of Dr. Livingstone ; and that the Expedition Committee be requested to report upon the measures advisable to be adopted.”

It was also resolved—

“That the President be requested to communicate this Resolution to Lord Stanley, with the expression of a hope that her Majesty's Government will see fit to adopt such measures as may appear to them most conducive to the end in view, in which not only Geographers, but the public at large, take so deep an interest.”

The PRESIDENT further stated that a large number of applications had been received from persons qualified to carry out, or to assist in this expedition, and that the desire was very general to set this question completely at rest. It was due to the character of our great traveller that the Society should not remain satisfied that he had met with his end, solely on the report of men who admitted that they were runaways, and did not stand by their leader.

The PRESIDENT also announced that the Geographical Society of France had awarded their Great Medal to Sir Samuel Baker, and that it would be presented to him at a Meeting on the 12th inst., when it was hoped that any Fellows of the Society who might be in Paris would attend.

CAPTAIN SHERARD OSBORN asked permission to make one or two remarks with reference to Dr. Livingstone. He met Dr. Livingstone at Bombay, when preparing for his expedition, and had some conversation with him on the subject of his journey. The traveller showed great anxiety to obtain men and cattle fit to carry burdens, among others water-buffaloes. Livingstone said his reason for taking the water-buffalo was that he might have a beast of burden that would enable him to accomplish the journey, for his success depended upon having the means of carrying his provisions and gear with him. He was indebted to the Sultan of Zanzibar for the conveyance of the water-buffaloes to Zanzibar from Bombay. He said if these failed him he did not know upon what he could possibly count. The buffaloes were all destroyed, he believed, before he reached the Lake, by the tsetse fly, which Livingstone hoped they might escape. His next resource was to fall back upon the sepoys he took with him from Bombay ; and they, too, had failed him. The last information we had of Livingstone came from men who had abandoned

him, and upon whom he depended in his peril. Livingstone's peril consisted in being left without the means of transport; and probably, if not sought for, we should hear of some of his small party being alive hereafter, just as we had heard within the last few days that members of Von der Decken's expedition were alive, twelvemonths after they were reported to have been slain.

The PRESIDENT said the Geographical Society took upon themselves the initiative in the search, but hoped for the assistance of Government, whose bounden duty it was to take a deep interest in the fate of one of their own officers, for Dr. Livingstone had been appointed Her Majesty's Consul to all the independent chiefs in the interior of Africa. With regard to the supposed survivors of the Baron von der Decken's expedition, alluded to by Capt. Osborn, this news was communicated in the following despatch from H.M. Political Agent at Aden:—

“Aden, Feb. 19, 1867.

“Mahomed Humal, the interpreter at the police court, who went last spring on leave to his native country, near Berbera, has returned. He reports that he sent four messengers to Nyadhira, in the hope of obtaining good information about the men of the St. Abbs, said to be in captivity among the Gallas. One messenger had died, one was still up the country, but two had returned without being able to get any tidings about the ‘St. Abbs’ people. They had, however, heard that four Europeans, described as one Nakhoda,* and three men, were in confinement among the Droosah. It was said they had been seized from a small iron steamboat in the Waber (Juba), near a mountain pass called ‘Jub-i-dug.’ If there is any truth in this story, these will be a portion of Baron von der Decken's unfortunate expedition. I have sent again to have further inquiries made. The Mijerteyn Sultan, from whom I expected the best and most reliable information, died, I regret to say, last summer. His death stayed for the time inquiries in that direction, but I have requested his successor to cause them to be carried on.”

The following papers were then read:—

- 1.—*On part of Mesopotamia, between Sheriat-el-Beytha, on the Tigris, to Tel Ibrahim.* By Lieutenant J. B. BEWSHER, Surveyor in Mesopotamia.

THE paper consisted of extracts of the official report of Lieutenant Bewsher, and described the various objects of interest, ancient sites, and canals, examined in his portion of the Mesopotamia Survey, which was taken up by Commander Selby and himself in the autumn of 1862.

The ancient canals, as a rule, appear to have had low banks, but raised slightly above the surrounding level. They generally wind considerably, and have ruins on their banks, often lining them for miles. In some places, near large ruins, they appear to have had regularly-built sides. From them irrigants were given off and led over the country in every possible direction. The author gave further details with respect to the Abu Ghurraib, the Nahr Aeesa, the Saklawiyeh, and other of the more important of these ancient canals.

* English master.

The author also discussed the site of Kunaxa, which he believed to be near the mound now called Kuneeseh, four miles to the westward of Senadiyeh. Chesney and Ainsworth, who had been over the same ground, had not noticed the name of Kuneeseh, which was the more remarkable, as this mound seems to correspond with that called Abu Ghurraib in the map of the expedition under Chesney. Kuneeseh is the Arabic for "church;" Lieutenant Bewsher believed the name Kunaxa might be a corruption of it, and that the great battle described by Xenophon was actually fought at this spot. The mound of Kuneeseh is 17 miles from Felujah, and $51\frac{1}{4}$ miles in a direct line from Babel, the northern mound of those marking the supposed site of Babylon. This agrees pretty nearly with the 500 stadia of Plutarch, which he gives as the distance between the two places. The author maintained that there was nothing in Xenophon's account of the advance or retreat of the Greeks that would disprove the supposition. The hypothesis was further confirmed by the existence of a pebbly ridge or mound, near Kuneeseh, 13 miles long and 80 feet high, which might be the hill mentioned by Xenophon as that on which Artaxerxes' cavalry made a stand after retreating from the Greeks. The position of Sittaki was next discussed, and that of the Median wall of Xenophon. With regard to the supply of water for the great irrigating canals, which always formed so remarkable a feature of this part of Mesopotamia, the author showed that it was derived from the Euphrates only, its bed being higher than that of the Tigris, and its water consequently being easily led over the plain.

The paper will be published *in extenso* in the 'Journal,' vol. xxxvii.

The PRESIDENT, in returning thanks to Lieutenant Bewsher, congratulated the Society on this addition to our knowledge of the Comparative Geography of Mesopotamia by an Indian officer, who had followed the admirable example of Sir Henry Rawlinson, to whom the Gold Medal of the Society was awarded when Major Rawlinson—for his paper upon Ecbatana. The devotion to these branches of research did honour to the officers of the Indian Service. Seeing Captain Selby present, who was the chief of this surveying expedition, and to whom the Society were much indebted many years ago for a valuable communication respecting the mouth of the Euphrates, and the district south of the country surveyed by Lieutenant Bewsher, he hoped to hear from him and other gentlemen some remarks upon the paper which had been read.

Captain SELBY stated that he and Lieutenant Collingwood many years ago completed a chart of Mesopotamia, in seven sheets, which he forwarded in 1862 to the Government; but they are not now to be found, and all the efforts made since that time to discover what had become of those charts had been ineffectual. With regard to the subject of the paper, he believed that in the course of his survey he discovered, at a district called Dura, the site of the golden image which Nebuchadnezzar the King set up. It consisted of a conical brick mound, about sixty feet in height, and seven feet square at the summit. He found by triangulation that it was twelve miles from the

King's palace at Babylon, and twelve miles from what he believed was the temple of Belus.

SIR HENRY RAWLINSON.—The Temple of the Seven Spheres.

Captain SELBY.—If the golden image was seven or eight feet high on the top of this mound, it would be visible at twelve miles' distance when the rays of the rising sun were falling upon it. The people who inhabited Babylon, at the sound of musical instruments, would fall down and worship the image just visible on the horizon. With regard to the Euphrates, he found that it flowed very nearly, within 150 yards, the same course that it formerly did, for its course in ancient times could be distinctly traced. All the streams had a tendency to flow to the south-east, owing to the slope of the land in that direction, and the Euphrates was no exception to the rule. Lieut. Bewsher had spoken of the wall he had discovered, and which he supposed to be the Median wall; having read what was said by Herodotus, he (Capt. Selby) could not but believe that this was part of the wall of Babylon. It was six feet wide, with bastions at intervals. The account which had been given of the cause of the loss of the water of the Euphrates was perfectly true. A channel was originally cut by a pious Mahommedan, to carry the waters of the Euphrates to the town of Moshid Ali; but, no care being taken, the stream gradually enlarged, and at last became a vast river. Four or five years ago Omar Pasha attempted to dam it, but the next year the current carried away the banks on either side of the dam, which is standing at the present day, and the waters spread over the adjacent plains. The Euphrates as a navigable river no longer exists. And there was cause for apprehension that the Tigris, like the Euphrates, would be lost in the same way, unless a more energetic government than the Turkish took measures to prevent such a catastrophe.

SIR HENRY RAWLINSON said he was very glad the labours of the gentlemen who had addressed the meeting had now been brought to the knowledge of English geographers, for such labours had been previously but little appreciated or even known. This was one of the services which the Geographical Society rendered to science, giving opportunities to gentlemen of making their knowledge available, which would otherwise be lost to the world. During a residence of twelve years in Mesopotamia he (Sir Henry) had had abundant opportunities of seeing the work of these Indian officers in connection with the survey of the country. He alluded especially to Captains Jones, Selby, and Collingwood, and Lieut. Bewsher; and he had no hesitation in saying that their labours were in the highest degree creditable, not only to themselves, but to the Indian navy, to which noble service—now, alas! abolished—they had belonged. The country to which Lieut. Bewsher's paper referred was the cradle of civilization; in it were first cultivated, contemporaneously with a similar cultivation in Egypt, the natural sciences and that study of art which afterwards spread through the world, through the instrumentality of the Greeks. Throughout Babylonia there were a number of important sites. Among the most ancient were Babylon and Kutha. He believed he was the first European who had visited the ruins of the famous city of Kutha. It was the place from whence the Babylonian colonists were transported to Samaria. Kutha was mentioned several times in the Bible, and the Jews had always called the Samaritans Kutheans, in reference to the original colonization. The ruins were now popularly called Tel-Ibrahim, that is, "the Mount of Abraham," Kutha being supposed to be the capital of Nimrod, and a tradition prevailing all through the East that Abraham was here thrown into the fire by Nimrod. This tradition seemed to have sprung from a false reading of the verse in Genesis, where it is said Abraham came out of Ur of the Chaldees. As Ur also meant fire, the passage was translated in the Chaldee Targums "came out of the fire of the Chaldees:" and as, if the patriarch came out of the fire, he must first have been thrown into it, there had been invented, in connexion

with this fire, a series of fables as to the adventures of Abraham at the court of Nimrod. Kutha, as the traditional capital of Nimrod, also furnished another Biblical illustration. Nimrod, being a great hunter, was identified in the popular superstition with the god of hunting, who was called in the old mythology Nergal, and when therefore it was said in Scripture that the men of Kutha made Nergal, it really gave an historical explanation of the myth through which the ruins at the present day bore the name of the Patriarch Abraham. He might mention that the first time he visited this place, Tel-Ibrahim, it happened to be a clear day, and he thus succeeded in taking a bearing of the great ruin at Ctesiphon, twenty-three miles in direct distance, with an ordinary theodolite. Capt. Selby had spoken of the tendency of the Euphrates to run off to the south-east, owing to the slope of the land in that direction. It was, in fact, only kept in its course by extensive dams, and this had always been the case from the remotest antiquity, every governor of the province, in ancient as well as in modern times, having been thus occupied in damming up the river so as to prevent its draining off. Alexander, indeed, lost his life from this very circumstance; for, in connexion with this work of repairing the dams, he was obliged to sail down into the marshes, where he caught the fever of which he subsequently died. There was, he might add, a perfect network of canals between the two rivers, and the water of both was formerly consumed in irrigation. The whole country, indeed—an area of 500 miles in length and 200 in breadth—was in former times one vast expanse of cultivation: it was now a sterile desert. He had mentioned, at a former meeting of the Society, that in consequence of this change in the physical aspect of the country the very climate had altered. When the water was thrown over the face of the country there were date-groves scattered over its entire surface; those date-groves attracted the clouds, and thus there were constant rains and showers during all seasons of the year. We never read in the 'Arabian Nights,' or in any of the old Arabic authors, of complaints of great heat. On the contrary, the gardens of Bagdad appeared in the eighth and ninth centuries to have been most agreeable places, where Haroun-al-Raschid and his officers enjoyed themselves amazingly; whereas at the present day the country was almost uninhabitable from May to October, in consequence of the excessive heat and aridity. In his house at Bagdad, the thermometer had stood at 125°, and in the sun outside it had been 170°. The natural advantages of the country were great, and, with the opening up of the old canals and the construction of other works of irrigation, and with security to life and property, the country would become again extremely productive, requiring very little ploughing or manuring. It was, moreover, a very favourable country for cotton. He had been assured that recently the cultivation of cotton had been very much increased, and that some specimens from the vicinity of Busorah would compare with a very good quality of Sea-island cotton from America.

Captain FELIX JONES said he had resided in Mesopotamia for a very long period, associated with Sir Henry Rawlinson and others, and would have liked to enter upon the subject of Lieut. Bewsher's paper. The clock, however, warned him there was no time left for minute topographical details, such as the identity of the site of Kunaxa required. As to the country itself, Sir Henry had been so very lucid and complete in his description, that he had really left others little to say. Lieutenant Bewsher's portion of the survey was a most creditable performance, and deserved praise, even though we might differ from his conclusions on certain minor points.

Mr. LYNCH had only one observation to make: it was with regard to the Median wall. He thought that point was settled by Captain Lynch and Dr. Ross many years ago; he visited it himself in company with these gentlemen in 1844. It extended from the western bank of the Tigris from above Istabalat—nearly opposite Kadeseyah and the ruins of Opis on the further

bank—along the edge of the tertiary formation, towards Feluga on the Euphrates, forming, he might say, the northern boundary of the alluvial plain of that part of Mesopotamia. It was built of masses of concrete and stone; no bricks, as in lower Mesopotamia, and had a ditch and glacis; and no one who had walked along it for several miles and seen that magnificent dyke extending as far as the eye could see, could doubt that that was the Median wall. It certainly appeared so to him, and it was a point of very great interest, as fixing a position in comparative geography there; for almost the whole of the lower part of Mesopotamia was one alluvial plain, the features of which had been often changed by inundations, and sites of ancient places rendered very doubtful indeed. However, the four canals mentioned by Xenophon could still be traced with great accuracy, in their ramifications throughout the whole country, which, with the Median wall, were the landmarks for the modern geographer.

Captain JONES said he must differ from Mr. Lynch as to the Median wall. It was true Captain Lynch—than whom a better surveyor does not exist—and Dr. Ross visited that part of Mesopotamia shortly after Colonel Chesney's expedition; but they had mistaken a dam for the Median wall, not having traced it to its extremity. He (Captain Jones) afterwards visited it; and, notwithstanding the opposition made by the Arabs, he succeeded in reaching the end of it, and he could positively state that it was not the Median wall, for reasons already fully given in his 'Researches in the Vicinity of the Median Wall of Xenophon, and Discovery of the Site of the ancient Opis.'

Mr. J. CRAWFORD believed there could be no doubt that very good cotton might be grown in Mesopotamia; but they must first get rid of the Turks, and then they must get rid of the Arabs, who were not quite so bad. If the country were well governed, and if the soil were well watered, there was no reason why Mesopotamia should not be as fertile as Lombardy, Bengal, or the valley of the Nile. At present, notwithstanding the high premium that had been put upon the cultivation of cotton by the American civil war, there had been very little grown in Mesopotamia, only a patch here and there; and, as long as the Turks were there, the production could never take place on a large scale.

2. *On the Sources and Course of the Lycus, and other Rivers in Kurdistan.*

By J. E. TAYLOR, Esq., H.M. Consul, Diarbetr.

[This communication has been printed entire in 'Additional Notices,' 'Proceedings,' vol. xi. No. 2.]

Captain JONES said Mr. Taylor's more extended paper would throw great light on that portion of Kurdistan near the sources of the Tigris. He would only add that Mr. Taylor might be depended upon for accuracy of observation and for energy in his researches.

3. *Description of Diarbetr.* By R. I. GARDEN, Esq.

MR. GARDEN visited Diarbetr in the year 1856, and the present paper gave an account of the principal buildings and ancient remains inspected by him during a stay of six weeks. It will be published in the 'Journal,' vol. xxxvii.

The PRESIDENT, in concluding the Meeting, announced the approaching departure of Mr. Edward Whymper on his self-imposed mission to explore

the interior of Greenland. Mr. Whymper was well known as one of the boldest and most successful of Alpine explorers; and the Geographical Society could not but anticipate important results from his projected expedition. He would start for Copenhagen on the 18th inst., sailing thence to Jacobshaven in Greenland in one of the Royal Danish Company's steamers. He need not say that they wished him God speed and every success.

Eleventh Meeting, May 13th, 1867.

SIR RODERICK I. MURCHISON, BART., K.C.B., PRESIDENT, in the Chair.

PRESENTATIONS.—*A. H. Louis, Esq.; Thos. S. Whitaker, Esq.; W. Felkin, Jun., Esq.*

ELECTIONS.—*John Bridge, Esq.; Richard Brown, Esq., C.E.; Alexander A. Knox, Esq.; A. H. Louis, Esq.; D. G. Sandeman, Esq.; Frederick Smith, Esq.; Sir John Walsh, Bart, M.P.; Geo. M. Waterhouse, Esq.*

ACCESSIONS TO THE LIBRARY, APRIL 8TH to MAY 18TH.—‘*Sulle Stelle filanti del 10 Agosto, 1866.*’ Donors, the Palermo Observatory. ‘*The Calcutta Cyclone of the 5th October, 1864,*’ by Lieut.-Col. J. E. Gastrell and H. F. Blandford, R.A. Donors, the Meteorological Committee Office, Calcutta. ‘*The Open Polar Sea: Narrative of a Voyage of Discovery towards the North Pole,*’ by Dr. I. I. Hayes. Purchased. ‘*Six Years of a Traveller’s Life in West Africa,*’ by Francisco Travassos Valdez. Donor, the Author. ‘*The Electric Telegraph: Was it invented by Professor Wheatstone?*’ 3 vols. Donor, Captain G. Arbuthnot, R.A. ‘*Paraguay; its History, People, and Government,*’ from the French of M. Quentin; 90 pages. ‘*The River Plate (South America), a Field for Emigration,*’ &c., 35 pages. ‘*Brazil as a Field for Emigration,*’ by Chas. Dunlop. Donors, Bates, Hendy & Co. ‘*Central Argentine Railway: Report of Third Meeting, 1867.*’ Donors, the Company. ‘*28th Volume of the Memoirs of the Bureau Topographique de la Guerre de Russie.*’ Donor, le Chef du Bureau. ‘*Das Nordlichste Land der Erde,*’ by Petermann, Berlin. ‘*Wrecks and Casualties: Reports for 1866.*’ Donors, the Wreck Committee of Lloyds. ‘*Die Insel Mallorca,*’ by H. H. Pagenstecher. Purchased. ‘*General Missionary Atlas, from original sources,*’ by the Rev. R. Grundemann. Donor, the Author. ‘*Exploracion oficial por la Primera vez des de el Norte de la America del Sur,*’ &c., by F. M. Y. Rojas. Purchased. ‘*Geology and Agriculture,*’ by E. St. J. Fairman. Donor, the Author. ‘*Martin Hylacomylus Waltzmüller; ses Ouvrages et ses Collaborateurs. Par un Geographe Bibliophile.*’

MAP ACCESSIONS SINCE THE LAST MEETING OF APRIL 8TH, 1867.—Map of Lower and Upper Canada, by J. Bouchette; presented by Dr. Mac Loughlin. Native Maps of Japan and the City of Yedo; presented by Mr. Coysh, F.R.G.S. Maps of the Inter-Oceanic Canals and Railways between the Atlantic and Pacific Oceans; presented by G. Welles, Esq., Secretary of the United States Navy. Maps of the Governments of Moscow, Nischni Novgorod, Viatka, and Vladimir; presented by W. Spottiswoode, Esq. Map of the Chinese Empire; presented by Dr. A. Petermann. Various MS. of Explorations in Vancouver Island, by R. W. Brown, Esq. 32 Sheets of Reymann's Map of Central Europe; by the Author. Map of the Tea Countries of Assam and Cachar, by Major Briggs; presented by A. K. Johnston, F.R.G.S. Ordnance Survey; 284 sheets. A view of the Village at Pitcairn's Island; discovery of the Mutineers of the *Bounty* by Capt. W. F. Beechey, in H.M.S. *Blossom*, in 1828; drawn by Admiral W. Smyth. Chart of the Arctic Regions, showing the discoveries of the *Fox*, Capt. Sir L. M'Clintock, &c.

Previous to the reading of the Paper, the PRESIDENT said he was happy to inform the meeting that, at the solicitation of the Society, as before announced, Her Majesty's Government had granted a certain sum of money towards fitting out a boat expedition in search of authentic news regarding Dr. Livingstone. It would be placed under the command of Mr. E. D. Young, who served two years under Livingstone in charge of the *Pioneer* and *Lady Nyassa* on the Shiré River, and who was well acquainted with the country and the character of the people. A steel boat would be built under the direction of the Admiralty, capable of being taken to pieces, so that it might be carried by land, past the rapids of the Shiré. She would be launched at the mouth of the Zambesi, with the aid of one of Her Majesty's cruisers; and, having procured a native crew, Mr. Young, and the three Englishmen he takes with him, would proceed to the north end of the Lake Nyassa; and arriving there, within twenty or thirty miles of the spot where it is said Livingstone was killed, they would ascertain whether the report of his death was a fable or not. It was not intended that this expedition should proceed through the interior in search of Livingstone, for if the traveller had once passed the territory haunted by the Mavite, he would have proceeded onwards to Lake Tanganyika, and the expedition would not be able to reach him. Their minds would, however, be set at rest, and they might hope that he would some day return to this country covered with greater glory than ever. With regard to the possibility of his having reached the far interior, Dr. Kirk had recently reported in a letter to him, that a caravan of Arab traders, coming from a village within ten miles of where Livingstone was reported to have been killed, a month or two after his supposed death, had reported to the Governor of Quiloa that they had heard nothing of it; but, on the contrary, that Livingstone had passed on into the friendly country of the Babisa tribe. This, he thought, was quite enough to satisfy them that they were right in sending out the expedition. In addition to this, he had received a letter that morning from Dr. Kirk, stating that a trader had recently arrived at Zanzibar, coming direct from Lake Tanganyika, who said that he saw and spoke with a white man on the borders of the lake. Now Tanganyika was the point to which Livingstone was directing his attention, with the view to determine whether that lake had an outflow to the north, and whether it might not be the ultimate lake-reservoir of the Nile. Dr. Kirk

said he had not spoken himself to the merchant, but had only heard the report of what he had said. If this trader had indeed met with a white man, the question was, Who was he? This report showed more than ever the propriety of the search which the Geographical Society had set on foot.

The following Paper was read:—

1. *Notes on Chinese Tartary.* By Capt. SHERARD OSBORN, R.N., C.B.

CAPTAIN OSBORN stated that he had written his memoir to accompany a carefully prepared diagram, which he now presented to the Society, of Chinese Tartary as it exists, so far as the treaties with Russia are concerned. He acknowledged the assistance he had received, in compiling the map, from the recent admirable Russian surveys of Eastern Siberia, and the map of the caravan routes in Central Asia, published by Colonel Walker, of the Trigonometrical Survey of Hindostan. Quoting from the geographical information which is contained in a publication issued in Canton some years ago, the 'Chinese Repository,' he proceeded to deal with the broad geographical features of Chinese Tartary, dividing it into the three great sections of Manchuria, Mongolia, and Ili, or, as it is sometimes erroneously called, Eastern Turkestan. Half of Manchuria, it was shown, had, by the Treaty of Tientsin in 1858, passed into Russian possession; but, owing to an almost impassable range of mountains being found to exist from the River Amur to the southern extreme, the communication between the Russian coast-settlements and Eastern Siberia was in no wise improved; but Captain Osborn hoped the day was not far distant when the Russians would come into possession of the whole of Manchuria, when, with the aid of the water communication of the Songari River and the port of Newchang, in the Gulf of Leotung, much would be done towards giving Russian Siberia that outlet to the seas of India and China which her rapidly increasing importance and commercial development justify the Russians in craving. The presence of Russian settlements so close to Peking, the lecturer argued, would act very healthily on the Chinese Government; and, so far as Great Britain is concerned, we ought, on every ground, to welcome any means of improved intercourse with Siberia, which, it must not be forgotten, now forms one of the largest and most powerful states in Asia. Passing to Mongolia, Captain Osborn then drew a picture of its physical condition, and called attention to the invasion of portions of China Proper by Mussulman hordes, flying before the pressure of Russian arms in Central Asia. He refuted the idea of the utter impracticability of the country for troops or armies, and, apart from the well known fact that in ages gone by the horsemen of this region marched west to the Danube, and south to the Tropic,

he related some incidents of a migration, on two occasions, of a host of Tartars from the Great Wall to the Volga and back, proving the journey practicable even for women and children, though a severe one. Turning then to the least known portion of Chinese Tartary,—which the lecturer dealt with under the name of Ili, north and south of the Celestial Mountains,—the peculiar basins into which it was cut up by the enclosing ranges of mountains, so that the rivers—one of them 1500 miles long—discharged into lakes instead of the ocean, was dwelt upon; its magnificent mountain scenery, its diversified climate and products, the ancient cities of Yarkand, Aksu, Khotan, and others, were touched upon, and the close approximation of the Russian and British frontiers was clearly shown, as well as the advantages likely to result to the cause of order, civilization, and Christianity in Asia, if those two great powers worked as they ought to do, earnestly and in a friendly spirit together, in establishing order and good government in the lands which, lying beyond the Himalayas, have for so many centuries been in the hands of cut-throat Mussulmen, or stupid Mongols, trained to exclusion and hatred of the foreigner by the policy of Peking.

The PRESIDENT, in returning the thanks of the meeting to Captain Osborn for his important paper, said that, with reference to the progress of Russian research, the author had not exaggerated in stating that the Russians had thrown more light upon the geography of the northern portions of Central Asia than all other nations put together. He confessed that he admired the zeal of the Russians in carrying out geographical research. He believed there was now a feeling on the part of many who formerly thought otherwise, that there was no ground for alarm on our part that a civilized Christian nation like Russia should dominate the “cut-throat” tribes of Central Asia, and open up a freer intercourse with China by land. He thought there was no ground for jealousy on our part; on the contrary, we ought to be very glad that the Russians were making such progress in opening up new lines of communication through Central Asia; that is, so long as they did not come too far south, and approach our Indian possessions. Among the Russian geographers who had distinguished themselves in Asiatic exploration, he might enumerate Semenov, Radde, Struve, and Boutakoff. In connection with this part of the subject, he had the pleasure to announce that the Council of the Society had that day adjudicated one of their gold medals to Admiral Boutakoff, for his discoveries in the Sea of Aral, and for opening up the Jaxartes for the first time to steamers.

Mr. HORATIO LAY, C.B. (formerly Imperial Commissioner of Customs in China), said it was in the year 1650 that the Russians first made their appearance on the Amur River. Their progress since then had been slow but sure, and they had met with great opposition on the part of the Chinese. In the year 1854, during the Crimean war, they formed, at the mouth of the Amur River, a secure port of refuge for their Pacific squadron. The river is navigable for 1890 miles. Nicolaiefsk is the chief seaport, and, with the liberality which had marked the Russian Government in this region, it had been declared a free port for twenty years to come. He (Mr. Lay) believed the advance of a strong civilized power, like Russia, in Northern and Central

Asia was certainly to be welcomed, inasmuch as the Chinese were growing weaker, and perfectly incompetent to rule the Mongol tribes. Their present hold on the Mongols was due to the investiture of the chiefs with titles and honours, and to largesses distributed among their followers. It was quite time that a more powerful people should come in, with the view of ruling and keeping these men in order. It was a singular circumstance that the Mongols of the North should follow the occupation of shepherds, and should lead the quiet life they did, considering the career of conquest they formerly achieved. In 1202, under Genghis Khan, they swept the country from Southern Persia as far as the north of China, and in 1215 they captured Peking. A nephew of Genghis Khan invaded Russia in 1235, captured Moscow, and ravaged Poland and Hungary. That this race of people should now be following the quiet life of shepherds was a singular change; for the Russians did not throw off the Mongol yoke until the fifteenth century.

Sir HENRY RAWLINSON said he had listened to the paper with great attention and interest. It was an admirable *resumé* of the varied information which we possessed regarding Central Asia, and it had the further advantage that it presented the subject in a popular and interesting point of view. With regard to the three divisions of the country which Captain Osborn had noticed—Manchuria, Mongolia, and Turkestan—that was not only a geographical division, it was also an ethnological one. The inhabitants of these three great divisions were in reality so many great branches of the Turkish race, speaking languages which might possibly be of the same family, but which were so distinct from each other that they were not mutually intelligible. He was not well acquainted with the eastern division of this great region, and should not therefore discuss it; but with regard to the western division, he must say he objected to Captain Osborn's extension of the Russian frontier line (as exhibited on the map) considerably further south than the actual condition of things warranted. Captain Osborn told them that by the Treaty of Peking the Russians were authorized by the Emperor of China to extend their frontier as far south as Khokand. The Emperor of China might just as well have mentioned Calcutta as the limit of the Russian dominion, because he had no more authority over Khokand than he had over Calcutta. China had never possessed a shadow of power to the west of the Thian-Shan Mountains. It was only, indeed, within the last hundred years—between 1756 and 1759—that she had extended her dominion over any part of Western Turkestan. A great expedition was then sent out, to which the Chinese emperor, with that enlightenment which distinguished his race, attached three scientific European astronomers, who in the course of the march backwards and forwards, between China and the Jaxartes, determined the position of some fifty or sixty of the principal towns and stations; and until within the last twenty years, when the English on one side and the Russians on the other, had been gradually approaching the central desert both from the south and north, it was the observations of these Jesuits which alone enabled us to construct a map or to possess any accurate knowledge of the geography of that part of Asia. No doubt the Treaty of Peking did give the Russians very great advantages in Central Asia; but the main advantage was the right of establishing consuls in the three principal commercial towns of Turkestan—Chughuchek, Kuldja, and Kashgar. The Russians immediately acted upon their rights at Chughuchek and Kuldja, but they had not been able to establish a consul at Kashgar. The Mahomedan inhabitants had now risen against the Chinese, and in many places had entirely destroyed them. At Kuldja there was continual fighting for two years. The Chinese were driven out ultimately, the Russian factory was destroyed, and from that time the place had been in the hands of the Zungar native population. Captain Osborn had detailed the routes leading from China through Central Asia with great accuracy: the southern route which led direct to Khotan had, however, been

shut up for the last twenty or thirty years, owing to sand-drifts. The route which had always been of the greatest importance, and which Captain Osborn had but imperfectly noticed, was the one which connected Russia with India. That route led from Semipalatinsk to Kuldja; from Kuldja across the great glacier pass of Muzat to Aksu; and from Aksu, when the country was pretty quiet, it followed down the Khotan River to Khotan, and thence to Leh in Little Thibet, and over the mountains to India. It was not by any means a difficult route, and, when tranquillity was restored, there was no doubt it would again become a great line of traffic. Captain Osborn had further called attention to the discovery of another and better route from Khotan, by Mr. Johnson, which he believed would lead into India without passing the great mountains of Thibet at all, by proceeding to the eastward and round the Kuen-luen chain. That line showed traces of having been a great imperial road in antiquity: it was discovered in its southern portion many years ago by Moorcroft; and, as Lord Strangford had stated at a former meeting, it was on this very road that Moore's famous poem of 'Lallah Rookh' was supposed to be recited while the party were travelling from Delhi to Khotan. With regard to the political part of the question, he (Sir Henry) was not an alarmist, but he did not go the length of Captain Osborn in actually wishing that the Russian territory should reach as far as the frontier of British India. For the sake of civilization and humanity, it might be perhaps desirable that the "cut-throat" tribes of Central Asia should be eliminated altogether from Asia. But we should remember, on the other hand, that the removal of these tribes might very seriously embarrass us. We must consider, indeed, that India is held by us as a conquered country, and inhabited by an alien race, and the same remark might also apply to the Russian possessions. If it had been merely a question of Russia and England being brought into contact in Europe, no great evil need have been anticipated; but Russian conquest and English conquest meeting each other in Asia, made a very different political conjunction. The natural consequence, indeed, would be that the people of India, in times of disquiet, would look to Russia for assistance; and those whom Russia had conquered would look to England, in the same way. There would thus be mutual recriminations, intrigues, a constant state of turmoil and warfare on the frontier, which, so far from civilizing the country, would have precisely the contrary effect. What he would prefer would be that there should remain always a small strip of intermediate neutral territory to serve as a kind of "political buffer." Across that the two nations might trade, and advance the cause of civilization in every possible way without politically interfering with each other. Entertaining, as he did, this view, he could not endorse the opinions expressed in the article in the January No. of the 'Edinburgh Review,' which was the exponent of the present policy of the Governor-General of India. Advantage, he thought, should be taken of any favourable opening for putting forward our feelers into Central Asia, not for the purpose of intrigue or hostility to Russia, but with the view of pushing our trade and advancing civilization on our side as Russia was doing on hers. Thanks to Sir Andrew Waugh and his assistants, we had surveyed the whole country from the frontier of India up to the Karakoram, which was the territorial limit of our ally the Maharajah of Cashmere. The attempt to go beyond that point was discouraged by the Government, for fear of leading to political complications. He should like, however, to see this restriction relaxed, and he thought the Geographical Society would be doing good service if it could in any way facilitate expeditions, such as that projected by Captain Smith and other officers, who wished to push across Central Asia towards China, and in fact into Mongolia. With regard to the medal to be given to Admiral Boutakoff, he was delighted to think that our country, represented by the Geographical Society, had risen above those petty party considerations and national jealousies which we were sometimes supposed to labour under; and that

we could, irrespective of nationality, acknowledge the merits of a man like Admiral Boutakoff, who, during the last few years, had performed the greatest geographical feat that had been achieved in Central Asia since the days of Alexander Burnes.

MR. TRELAWNEY SAUNDERS said there were two maps* in the Society's collection which gave much more information than the map under discussion. With regard to the changes now taking place in these regions, we ought to be prepared for the possible contingencies. Chinese Tartary had been the birthplace of warlike hordes that in former times overran Europe and Asia; and when, after years of peace under a settled government, it should again overflow with a teeming population, what would become of the surplus? They would not advance to the icy north, but would naturally turn to the south. Unless we were prepared to meet that issue, we ought not to encourage Russia to advance into Central Asia. On the other hand, without any desire to increase our own frontiers, we as a trading, industrial people, ought to encourage peaceful industry and production in the great pastoral regions of Central Asia, which were capable of producing wool to an untold extent. Nothing could be more fraught with beneficial results than the promotion of intercourse with the local chiefs, pointing out to them that their products would always find a ready market on the Indian frontier. Nothing remained in the way of such a trade but the obstacles interposed by the Chinese Government, which he thought might be removed by a little firmness on our part. Under the Treaty of Peking we had a right to be placed on the footing of the most favoured nation, and to be allowed to establish a consul and to build a church at Kashgar, the same as the Russians claimed the right to do by treaty.

Captain SHERARD OSBORN, in the course of a brief reply, said, in making their treaty with China, the Russians decidedly considered that the Chinese had the right to give them permission to come to Khokand, or they would not have asked permission. He had merely drawn the frontier south of that place, to which Sir Henry Rawlinson had called attention, to show the extent of territory to which the Russians now had access: he did not say that they were there, only that the right to go there did exist. Adverting to the possibility of the Russian armies advancing as far as Bokhara and Khiva, about which many people were incredulous, Captain Osborn narrated the main particulars of an extraordinary migration of a horde of Calmucks 600,000 strong, in the winter of 1771, from the banks of the Volga to the banks of Lake Balkash, in the face of the greatest difficulties, and with the loss of only one-third of their number, to show, as he said, that what was possible once was possible again. To cross the deserts and passes into India was only a question of time. There were no more than 120 miles of desert; all the rest of the country was covered with Calmuck hordes who wandered about it at all seasons; and the notion we had of its impassable character was owing purely to our ignorance. He had no doubt that, when the Russians found it to their interest to advance, these wastes would become inhabited.

THE PRESIDENT said he had never at any time expressed a wish that the Russians should become the conquerors of this great region. Russia had no such object; her object was trade with China; and as long as she went from west to east to trade with China, and kept up a communication which she had enjoyed long before we had any conquests in India, she was perfectly entitled to do so. He firmly hoped that the great mountain barrier and impassable tract between the two nations would be left for ages to come. The Russians had shown the greatest openness on the subject of their researches in Central Asia, and had communicated to the Royal Geographical Society copies of all maps they had published.

* Stanford's Library Map of Asia, and Stanford's Map of China and Japan.

ADDITIONAL NOTICES.

(Printed by order of Council.)

1. *A Boat Journey across the Northern End of FORMOSA, from Tam-suy, on the West, to Kee-lung, on the East; with Notices of Hoo-wei, Mangka, and Kelung.* By DR. COLLINGWOOD, F.L.S.

TAM-SUY is situated on the north-western coast of Formosa, and possesses an excellent harbour, over the bar of which H.M.S. *Serpent*, drawing 12½ feet water, passed easily at high water. The entrance is unmistakably marked by two lofty and picturesque hills—that on the left, termed the Kwang-yin Hill, having two prominent peaks, of 1720 and 1240 feet respectively—and that on the right, the Tai-tun Hills, forming an imposing ridge, of which the summit is 2800 feet high. From land to land, at the entrance of the harbour, is just half a mile; but a considerable spit of sand diminishes it more than one-half. Within the harbour, however, it rapidly increases to three-quarters of a mile and even a mile in width, affording good anchorage for large vessels. Immediately on the left hand, on entering, is a small Chinese fort; and half a mile higher are the ruins of an old Dutch fort,—a square, red-brick, casemated building, once, no doubt, of great strength, and elevated 50 or 60 feet above the water's edge. The long rambling town of Tam-suy, or *Hoo-wei*, as it is more properly called, commences a little higher; and consists, for the most part, of a narrow street of shops of a poor description, paved with great cobblestones or not at all, and in which pigs of all sizes and barking dogs dispute the passage, which in some places scarcely admits of two passengers passing one another. The Vice-Consul (Mr. Gregory) resides here, as well as three or four other Europeans, engaged in mercantile affairs or employed in the Chinese customs. The consulate, however, is but a poor building for the representative of Great Britain; for the inhabitants, who are mostly coolies, and upon occasion are a turbulent set of rascals, have a *prejudice*, forsooth, against building houses more than one storey high, and no such dwelling exists in *Hoo-wei*.

There is a very pretentious joss-house in the town, of which the stone pillars, elaborately carved, represent, with considerable cleverness, fantastic dragons encircling the columns in high relief—workmen being yet engaged in the task. The immediate neighbourhood is hilly, having numerous scattered houses; and a large amphitheatre, just outside the town, forms an immense and well-filled burial-ground, upon which grows abundance of the rice-paper plant (*Aralia papyrifera*), which is largely exported from this neighbourhood. The soil is very fertile, consisting of a considerable depth of alluvium, in which are numerous angular and rounded blocks of stone, some of very great size.

The inhabitants of *Hoo-wei* (Tam-suy), as of the other towns in the route, are mostly poor and meanly clad—the males wearing usually nothing more than a pair of short drawers, or some substitute for them—some of the younger male children going entirely naked. The women and girls, however, are always decently clothed, very few of the female children being even naked to the waist. Bandaged feet are universal among them.

Rice is abundantly produced in the neighbourhood; but its exportation is forbidden by the Government, on pretence that there is not more produced than is required for home consumption; but by a roundabout method, a considerable trade is, notwithstanding, carried on, to the advantage of the Mandarins. Bullocks, goats, and poultry are difficult to obtain; but pigs are

abundant, though few who could witness their disgusting habits and foul feeding would care to eat them. Ducks also are plentiful.

An inferior Mandarin resides here, named Lim-ching-fang, but he is subordinate to the Mandarin of the Tam-suy District, of which Hoo-wei is but an inferior town—the chief town being Mangka, or Bangka.

Having obtained a *sampan*, or native boat, with three men, we placed in it provisions for two days, camera, collecting apparatus, &c., intending to proceed leisurely. The boat was a flat-bottomed one, adapted for the peculiar navigation, about 20 feet long and 6 feet wide, covered with a bamboo awning, and having a grass mat at the bottom; and, with the aid of a large mat-sail and a sea-breeze, we rapidly proceeded up the Tam-suy River. For the first 4 miles the stream is of varying width, averaging about a mile, and running in a south-easterly direction at the foot of the Kwang-yin Hills, which seen in the light of a western sun have a remarkably piled-up or cone-in-cone appearance, and at the base appear to be perforated with caverns. On the right bank a cultivated plain stretches to the foot of the Tai-tun Hills, which expand to the eastward as we proceed. At length at a village, called Kan-tow, the stream divides, the left arm continuing in a south-easterly direction through a flat country, in which rice and sugar and maize are cultivated, and a straight reach of $3\frac{1}{2}$ miles brings us to Twa-tu-teen, a large village where the stream trends to the south; and another mile and a half brings us to Mangka, the chief town of the district of Tam-suy. This is a large town, abounding in the narrow and unsavoury streets before mentioned—one side being covered over by a sort of arcade, the other side open, but by far the dirtier of the two, being chiefly occupied by pigs and children, which both swarm everywhere. Accumulations of filth lie about at the very doors of the inhabitants, and it is not unusual to see women adorned with bright and gaudy finery sitting within a foot or two of a pool of seething filth, enough to breed a pestilence. Chairs or sedans are to be had here, and in one of these I perambulated the town; but in some places the corners of the streets were so narrow, that it was with the utmost difficulty that the vehicle could turn them, and then only by a series of ingenious manœuvres. A single European merchant resides here, Mr. Mallisch of Hamburg, occupying a handsome two-storied house, the only one I have seen in those parts, it being “against joss” to raise one storey above another.

In making the journey from Tam-suy to Kelung, the other arm of the river *e. by s.* is followed, which does not lead by Mangka; but I have referred to this arm, because it leads to that place which I had visited previously in company with Captain Bullock, of H.M.S. *Serpent*, and Mr. Gregory, the Vice-Consul. On this occasion we paid a visit to the military Mandarin of the district, Ching-yung, with whom an appointment had been made, and who received us with official formality. His residence was situated just outside the town, and a salute of three guns greeted us as we entered the enclosure. Having seated ourselves in the audience-chamber, tea was served in cups of egg-shell china, by a number of attendants, when they had succeeded in chasing out the ragged crowd which had curiously followed us into the *sanctum*. The Mandarin was decorated with a clear blue button and peacock's feather, and appeared an intelligent and superior man of about 35 years of age. He conversed freely through the medium of Mr. Gregory, who acted as interpreter, and, after remaining some twenty minutes, we quitted the place with the same formalities as on entering, the Mandarin having first accepted Captain Bullock's invitation to visit the ship at Hoo-wei the next day, which happened to be Her Majesty's birthday, a promise which he did not fail to keep.

Mangka derives considerable importance from the fact that large junks come thus far, and one arm of the river which divides just beyond flows from San-Kop-yung, which is the district producing large quantities of camphor; and here the junks load with that important commodity derived from *Laurus cam-*

phora. But the trade is at present of little value to any one, except those to whom a monopoly is granted by the Chinese Government. The camphor Mandarin pays 40,000 dollars per annum for this privilege, and he purchases the camphor at the rate of 5 dollars per picul (of 133 lbs.), which he then sells for 27 dollars. One dollar as duty and some other expenses increase the price he has to pay, and 10 per cent. of the camphor is lost in the transit by evaporation owing to imperfect storage, for with the proverbial conservatism of their nation they will not adopt the plan of stowing it in tin boxes, by which it might all be saved. Still, however, the profits are very considerable. I believe that an enterprising young German merchant, Mr. Lessler, of Tamsuy, is about to bring the question of the legality of this monopoly to issue in a court of law, and I trust that this important trade will soon be open to competition by European merchants.

The other branch of the river in this direction is navigable for boats up a series of rapids, to the borders of the aborigines' country, as I am informed by Mr. Gregory, to whom I am indebted for much that is interesting in connexion with this subject.

Returning now to where the river first divides at Kan-tow, we follow the right-hand branch which flows E. by S. through cultivated fields, in which we occasionally meet with patches of *Boehmeria nivea*, and small groves of betel-palm (*Areca catechu*); but the characteristic tree of the banks here, as everywhere along the river, is the bamboo, whose graceful and feathery foliage gives a great charm to the scene. On the north-east side are numerous hills, of heights varying between 1000 and 1500 feet, amongst which are situated the remarkable sulphur-springs which I have described in another place. A little more than 3 miles brings us to the village of Pah-chie-nah, which is more airy and cleanly than either Mangka or Hoo-wei, and possesses an excellent market-place, though the inhabitants appear to be of the same poor class. Numerous duck-boats are met with on these banks, which bring some couple of hundred ducks to a feeding-ground, where they are turned loose to spend the day under the charge of a lad, who acts as duck-herd. They keep close together all day, so that they might all be covered with a blanket, and at night are conveyed in the boat back to their pens. Another feature of the route is the Chinese water-wheels for irrigating the fields, in which three or four Chinese are constantly at work, treadmill-fashion.

At sunset we moored our boat a mile beyond Pah-chie-nah, in a bend of the river and at the foot of a hill which commanded a magnificent view of the noble range of mountains running from north to south of the island, and which the setting sun lighted up gloriously. On the opposite side of the river, upon a steep rocky bank, was a house outside of which sat a family of Chinamen of a better class, the head of which, having examined us with a field-glass, made signs for us to go over and *chin-chin* with them. We accordingly did so, and, having partaken of their tea, offered them some of our own provisions, with which they appeared much interested, particularly the white bread, though the loaf-sugar seemed most generally appreciated.

We slept in the boat, the night being brilliantly fine, a strong dew falling towards sunrise, and the stillness being broken by the croaking of frogs, the chirping of cicadas, the occasional leaping of a large fish in the stream, the passage of boats up the river, and the distant creaking of a water-wheel which appeared to be in action all night long. A strong tide was flowing; but the water appeared perfectly fresh to the taste, even at the flood.

The following morning, after taking some photographic views, capturing some of the beautiful butterflies and beetles which, especially the former, abounded on the hills, we proceeded on our journey. The thermometer being at 89° in the shade, we were glad of our bamboo awning; and there being no wind and a strong ebb-tide, we made but little progress for some time, moving slowly by a very meandering course through a highly pictur-

esque country. Hills of varying height rose on either side, usually covered with vegetation, and occasionally opening and showing green paddy-fields, while in front of us an abrupt and very remarkable long stratified hill occupied a conspicuous part of the landscape, which we gradually approached till we reached the town of Lik-kow, behind which it was situated.

Lik-kow is similar in character to the other towns on the route; but the streets are wider than those of Mangka or Hoo-wei. The inhabitants, however, did not give us any notion of their being more simple or primitive on account of their comparative seclusion, but rather the reverse. A noisy crowd followed us through the streets, some members of which appeared to incline to impudence, and one man seemed by his loud talk and gestures to be attempting to incite others against us, while the general greeting of "*hwan-ha*" (foreigners) was heard no less here than everywhere else on the route.

Leaving Lik-kow we proceeded eastward through similar scenery, increasing, however, in its striking character, for some six miles further. A little beyond Lik-kow on the left bank, a bed of large oyster-shells, some of them 8 or 9 inches in length, arrested our attention. They are embedded in stiff blue-clay in the river's bank, and immediately over lies a thin seam of an inferior coal, which crops out beneath. The bank (which, as in most other places, was perforated with the innumerable holes of freshwater crabs), including clay, shells, and coal, is about 4 feet high above the water's edge, and the bed extends about 100 yards in length.

We arrived at the town of Chuy-teng-cha at nightfall; and here, as its name implies, the tide-way ends. As it was dark we did not land, but proceeded a little further, and passed the night in a little bay at the foot of the rapids. Numerous boats upon the beach and many in motion seemed to show that this was a busy town of some importance; and by questions put and answered, as we passed, in which we could hear from time to time the word "*hwan-ha*," we knew that they were discussing our movements and the kind of freight our boatmen had under their charge. We had no fear of them, however, for they turned out to be excellent fellows, good-tempered, willing, and obliging, and mightily amused at all our proceedings—one of them, in particular, laughing from morning till night.

On the second night, as before, we were tormented by mosquitoes, which made it difficult to obtain any rest; while the close heat of the atmosphere made us wish to divest ourselves of some of our clothing, a proceeding forbidden by the tormenting insects. Frogs and cicadas, as before, kept up a serenade all night; and a nocturnal bird sang a harsh song in some trees upon a cliff opposite. I could not get a sight of this bird, whose four notes somewhat resembled the creaking of a wheel; the last two notes being often repeated, and sometimes twice. As soon as dawn began to appear, he flew away, and I heard him no more. At the same time two or three large bats, which at first in the twilight I mistook for owls, flew home to their retreats with a loud croak.

As soon as the sun arose, a pheasant began to crow upon the fern-covered hills, and we heard and saw several during the day; but, although I landed for the purpose, I was unable to get a shot. But by far the commonest bird we met with throughout was a black bird about the size of an English ousel, with a long forked tail and whitish rump, which made a harsh note not unlike a jay. These birds were visible everywhere along the banks, usually in pairs, seldom flying over the river, and often perched upon the topmost spray of a bamboo in a conspicuous position. I procured the nest and eggs of this bird. The nest was made of dried grass and cotton-grass, simple in form, and situated upon the bough of a tree about 15 feet from the ground; the eggs were three in number—pinkish, with sparse umber spots and blotches, particularly about the larger end. The other birds I noticed were doves of a small species, kingfishers, pied wagtails, and grey shrikes. Early in the

morning, a lark singing in the fields could scarcely be distinguished from the English skylark, and another bird's song reminded me greatly of the English song-thrush. Another thrush-like bird also was in song; but not more than half-a-dozen birds could be said to be in song at a time, when nearly thirty would be enlivening the woods and groves of England.

Having passed the end of the tide-way, the remainder of the journey was made through a series of strong rapids, up which it was necessary to drag the boat by main force. They commenced immediately from our resting-place of the previous night, and our boatmen jumped out at the bows, and passing a bamboo across them pushed one on each side, while the third pushed behind, and thus our flat-bottomed craft moved up the incline into a reach of deep water. This proceeding was repeated perhaps a score of times, the intervening reaches being bounded by very beautifully wooded hills, with precipitous rocks dipping to the water's edge about 15° to the east. Many beautiful secluded retreats were thus passed, generally, however, with signs of life near them; for it is remarkable how densely populated this side of the island appears to be—nowhere can you go without meeting Chinese in some form or other: in the quietest and most retired spots, a cottage may often be descried upon close inspection. If you wish to shoot a bird among the brushwood, you will be most likely to find a group of women and children peering at you from behind; if it is on the bank, some fisherman at work, or lads wading in the mud for shell-fish, or women washing in the stream, are sure to be there, so that it is never safe to shoot, except at the upper part of the trees. Ferries were numerous, and generally at work as we passed; water-wheels were met with at every turn, generally worked by three men, or two sets of three; children leading water-buffaloes on the bank were frequently seen, and the unwieldy heads of these animals often peered at us above the water with a mingled expression of curiosity and stupidity; and even in the midst of the stream were Chinamen and boys, sometimes stark naked, but more frequently with something about the loins, dredging for shell-fish and crabs in the river—for everything is fish that comes to the Chinaman's net, and he is always at work, even in the most unpromising situations, to earn a livelihood in a mud-bank, or a sand-flat, or up to his neck in water in a river. Population teemed everywhere, and, while in England you might walk for miles without meeting an individual, we were scarcely ever out of sight of some human being in this part of Formosa. Their houses are built of mud and thatched, occasionally more substantially of brick and tiles, but usually of grass and reeds, which are arranged in tiers, and plastered over with mud and cement,—the floor, even of the better houses, of mud or earth,—the roofs, often crescentically gabled, gave the town a very characteristic appearance. In the poorer houses in villages, the pigs and fowls made themselves quite at home in the interior, and I have seen a large cesspool only partially separated from the dwelling-room. Pigs, fowls, ducks, geese, and buffaloes are the only domestic animals, if we except the dogs and cats. The cats usually of the Japanese breed, with a short broken or twisted tail, and usually tortoise-shell in colour; the dogs are usually black, seldom white, of an ugly mongrel appearance, about the size of a pointer, and bark vigorously as soon as they catch sight of a foreigner, though there is no fear of their biting, provided you carry a stick, being the most arrant cowards. Horses and asses are unknown, and humped cattle, of a small size, rare.

At length we entered a narrow gorge of rocks, which only left room for two boats to pass one another, and warned us that the aquatic part of our excursion was at an end, and in a few minutes we were in the midst of a number of boats the counterparts of our own, which completely lined a beach about 100 yards long, scarcely leaving space for the painted nose of our own craft to insinuate itself between them. Here were clustered some houses forming the village of Liang-kha, about three miles from Kelung, where the river we had

ascended abruptly terminated on the shoulder of a hill, up which we had risen by a series of rapids, another and a smaller stream branching off from the same spot, and descending the other side towards Kelung.

Having placed our gear in a chair obtained from Kelung, we proceeded on foot through a pass on the hills, meeting on the way numerous coolies transporting goods of various kinds from Kelung. Some carried heavy bundles of dressed hemp; others, barrels of dried flying-fish of a large size. A sudden turn of the road brought us in view of a splendid panorama—the valley, town, and spacious harbour of Kelung, forming altogether a fine picture. On the densely wooded knolls in the valley, tree-ferns were conspicuous; the sandstone hills on the left dipped in long stratified lines to the south-west; and outside the harbour, in which three square-rigged ships, as well as numerous junks, were lying at anchor, stood like a sentinel an abrupt rock, 600 feet high, known as Kelung Island, and bearing a great resemblance to St. Michael's Mount. On the right was the interesting coal-region, which renders Kelung so important a port, in which good anchorage and plenty of fuel may be always readily obtained.

The town of Kelung differs in no respect from the other towns of North Formosa. It is situated at the very head of the bay which constitutes Kelung Harbour, and consequently a long way from the anchorage: for the upper part of the harbour is a mere mud-flat at low-water, with a narrow channel in the midst, scarcely deep enough for the native sampans, although small junks do go high up and ground with every tide. The harbour, however, opens out into a fine bay between two ranges of hills, measuring from Kelung town to the entrance fully two miles, and in its widest part upwards of a mile wide. The entrance measures three-eighths of a mile in width, opening to the north-west. In such a spacious harbour, with few dangers, it might be supposed that a large number of ships might safely anchor; but unfortunately the short-sightedness of the Chinese authorities permits it to deteriorate rapidly, and, what is worse, the indolence of the people is producing effects of the most fatal kind; for when ships arrive in ballast, the boatmen, instead of taking it on shore, throw it into the harbour, and thus quickly accumulate the obstructions which it should be their care to remove. I myself saw this going on, and am assured that the harbour has very materially degenerated during the last two years in consequence. The harbour of Tam-suy is undergoing the same change; and at Takan-con, although it is forbidden to ships to throw overboard their ballast, the Chinese coolies, who are hired to take it away, convey it a few yards and throw it out of their boats.

The harbour of Kelung is hollowed out of the sandstone strata which are here very thick, and inclined at an angle of about 15° . The cliffs are worn into numerous picturesque ravines on either side, which are mostly well wooded and have several villages and hamlets scattered along their bases. On the north-eastern shore are several natural caverns, some mere clefts in the rock, and others penetrating to a considerable distance—all overgrown with drooping ferns, club-mosses, and begonias. The largest has a spacious entrance and penetrates as a vaulted arch for about 50 yards. On the left-hand side, however, is a narrow cleft just large enough to admit a man; through this we crept with difficulty a distance of 70 or 80 yards, when it expanded into a moderate-sized chamber, which we illuminated with the magnesium light, but discovered no passage beyond. At the very extremity of this cavern, the walls of which were of bare sandstone and dripping with the water which was percolating plentifully through them, a number of crickets (*Acheta*) had taken up their abode; though what could be the inducement, or what they could feed upon, it would be difficult to say. Unlike the inhabitants of caves generally, they had perfectly well-developed eyes, and I could only regard them as insects which had strayed in by accident.

Palm Island, at the entrance of the harbour, produces no palm-trees, as its

name would seem to indicate; but they are represented by cycads, which have probably been mistaken for them. This island presents unmistakable indications of having risen above its former level in comparatively recent times, and similar indications in other parts of the harbour seem to show that a gradual elevation is taking place; a circumstance which renders it more necessary to preserve the integrity of the harbour from the recklessness and ignorance of the native coolies, who misuse it in the manner previously noticed. Its importance is yearly increasing as a harbour of refuge, as a port of trade, and more particularly as a coaling-station; and its present value may be judged of from the fact that the *Serpent* was one of eight European vessels at anchor there at the same time, the others being Hamburg, Bremen, Prussian, and English ships.

2.—*On the recent Peruvian Exploration of the Rivers Ucayali, Pachitea, and Palcazu.* By MESSRS. WALLACE and MAIN.*

(Communicated to Mr. BATES, Assistant-Secretary, by M. LAURENT LETOFFÉ, of Yquitos, Peru.)

PERU has signalised herself during the last fifteen years by an earnest desire to open up to navigation and commerce those rich tracts of territory lying to the east of the Andes and watered by the majestic Amazons and its tributaries. Succeeding Cabinets have vied with each other in their efforts to promote so laudable an undertaking, and not even the distraction of a civil war, followed by a desperate struggle for national independence against foreign aggression, have been sufficient to hinder the prosecution of the enterprise. In the year 1851 the Peruvian Government concluded a treaty with Brazil relative to the navigation of the river Amazons, declaring at the same time her portion of the great river and its tributaries open to the navigation of the world.

Since 1862 the navigation of Peruvian territory has been carried on by their own vessels without intermission, in conjunction with a line of steamers passing from the Brazilian frontier to Pará. In the same year (1862) arrangements were made in England for the construction of a floating dock, and the establishment of a factory, to meet the wants of increased commerce, under the direction of Mr. Daniel Clark, chief engineer and director. Since that time great progress has been made in the province of Loreto, particularly at Yquitos, where the factory is established and the floating dock being built. Instead of little more than a few Indian huts, a large and populous colony is springing up. European labour has been introduced, mechanics of good ability have been secured, and to-day the engineering predominance of Great Britain may be seen as a prime mover in civilisation on the mighty Amazons. We must not omit to notice two small steamers intended specially for the exploration of the smaller rivers that flow into it, named the *Napo* and *Putamayo*, constructed by Messrs. Samuda and Co., with engines, worked at high pressure, by J. Penn and Sons, and despatched to Pará, where they were put together.

With the intention of further perfecting communication between the Atlantic and the interior of Peru, the *Putamayo*, under the orders of Captain Vargus, was despatched from Yquitos, on the 25th of June last, to explore the rivers Ucayali and Pachitea. After having navigated the river Ucayali and entered some sixty miles into the Pachitea, two of the officers, Tavira and West, who wished to open negotiations with the Indians, went on shore, and while in the act of presenting them with beads they were cruelly

* Two Englishmen, serving as Engineers on board the Peruvian vessels.

murdered by repeated discharges of arrows. The steamer having got aground and suffered some damage, it was found necessary to return to Yquitos, where another expedition was speedily organised. This consisted of three steamers, the *Morona*, *Napo*, and *Putamayo*, under the orders of the Prefect of the Department, Don Benito Arana, whose flag was hoisted on board the *Morona*, under the command of Lieutenant Eduardo S. Raygada. For the following account of the exploration of these rivers we are indebted to one of the officers who accompanied the expedition on board the *Morona*.

"We entered the Ucayali on the morning of the 15th of November, and anchored at Cedro Isla, 27 miles from its mouth, on the same day; on the 16th we anchored at 1 P.M. at Garga Cocha, 42 miles; on the 17th we arrived at Huanico, 75 miles, and resumed our passage from thence the following day, arriving at 2:45 P.M. at Palisado, where we took in fuel and anchored for the night at Comacera Isla, 32 miles; on the 19th we reached Puirí Isla, 50 miles, where we also took in wood; on the 20th the expedition cast anchor in Punahua, 21 miles; on the 21st we arrived at Cruz-moyona, where we anchored; and on the 22nd we reached Sarayacu, where we remained until the 26th taking in provisions and wood.

"During the eight days we had been navigating the Ucayali we found the average depth of water from 6 to 12 fathoms, with a current of from 2 to 3 miles per hour, so that it is navigable for vessels of great tonnage without risk, the distance run from Nauta being $356\frac{1}{2}$ miles. On the 26th we left this port, passing a large lake called Cocha Huaya, and at 3:30 we anchored, having steamed this day 54 miles without encountering the least impediment, never being in less than 6 fathoms water. On the 27th we arrived at Cachiboya, $34\frac{1}{2}$ miles. This village is situated inland 18 miles from the margin of the river, and this night we felt the shocks of two slight earthquakes. We left Cachiboya at 8 A.M. on the 28th, and anchored near the island of Canario, 34 miles, having found this and the previous day from 6 to 7 fathoms. On the 29th we arrived at the creek which leads to the village of Calleria, situated inland some 25 or 30 miles. On the 1st of December we arrived at Puja Hualpa, 33 miles; and on the 2nd, after the celebration of divine service by Padre Calvo, we got under weigh and anchored at the mouth of the Tanvayo, 26 miles, the distance run from Sarayacu up to this point being 250 miles.

"On the 3rd December, at 5 A.M., we continued our voyage, and entered the river Pachitea at 10 A.M., saluting its virgin mountains with 21 guns, casting anchor 3 miles from its junction with the Ucayali in 7 fathoms. Whilst the crews of steamers were cutting wood for fuel, the chief of the expedition, having been informed that some Indians of the Cashibo tribe were living on an island called Sitico, sent a boat, manned by six Conibo Indians whom we had taken on board at Sarayacu, friendly to the whites and constant enemies to the Cashibos, whom they persecute and kill at every favourable opportunity. The Prefect believed that these Cashibo Indians might be acquainted with the place inhabited by the savages who had assassinated the unfortunate officers Tavira and West, and as the sequel proved he was not deceived. When the boat returned she brought two of the above-mentioned Indians from Sitico, who offered to take us to the spot inhabited by the Cashibos Boninaguas. After cutting wood until the 6th, we continued our voyage and anchored 3 miles below Chonta Island, in order that the savages might not be alarmed by the sound of the wheels.

"December 6th, at 4 P.M., the soldiers and attacking party being formed, accompanied by the Indian guides, we were put on shore, and defiled into the woods, where the undergrowth is so thick that it requires in many places, in order to open a road, a long knife which the civilised Indians generally use. After marching until 9 P.M. we halted, and at 4 A.M. the following day, resumed the toilsome march. About the middle of the day we came to several

huts, out of which rushed a number of armed savages, who were immediately shot down, as they attacked the soldiers with their arrows on their sallying from their huts. Those who were not mortally wounded escaped into the bush, where it was impossible to follow them, although the hideous cries too plainly indicated their proximity. In one of the huts we found and took prisoners a number of children and two women, who at the expiration of the deadly conflict which ensued were taken on board the vessel in order to be sent to a convent in Callerio. Outside the huts was a raised platform, on which our unfortunate brother officers had been so cruelly sacrificed to the inhuman appetites of these fiends in human form. One of the captured women, who was raving and foaming at the mouth at the sight of her expiring husband, rushed to one corner of the hut, and bringing some human teeth connected by a small string, dashed them on the ground, saying, 'There are the teeth of the white men.'

"No time was lost in collecting the remains of the dead savages, which were placed within the huts and the latter set fire to, and when they were in full blaze the party commenced the returning march. After we had proceeded a few miles we were suddenly surprised by a flight of arrows falling in the midst of us, which was as speedily returned with a shower of balls, but on account of the denseness of the forest no very accurate aim could be taken; but this combat lasted until we arrived at the river's edge, fortunately without any of our party being mortally wounded, although some were most painfully disabled. The boats were waiting for us at the river's edge, as those on board had been warned by the firing. After all hands had embarked and put off a small distance from the shore, several bodies of savages came howling to the water's edge, shouting in their language, 'Stop until our companions arrive, and we will kill you all;' but they were speedily dispersed by several discharges of grape-shot from one of our cannon.

"On the 8th December we left our anchorage and steamed to the Pascual-ticasca Narrows. On the 9th, although finding from 2 to 4 fathoms, we encountered a terrific current, having run 42 miles since yesterday. The 10th, 11th, and 12th we remained at anchor. The 13th we continued our voyage, conquering the difficulties which we encountered at every step, owing to the channel, which was in places no more than 80 feet broad. At 6 p.m. we anchored in 2 fathoms, having steamed this day 35 miles. On the 14th we left at 10 o'clock, and after having passed the Island of Cebuya, at 6 in the evening we found ourselves in one fathom of water, where we anchored. On the 15th we started at half-past 6, and anchored two hours after. The 16th was occupied in cutting wood. On the 17th we anchored at San Fernando. On the 18th several Cashibo Indians appeared at the river-side, and in their language expressed a desire to be our friends. Taking due precautions, we presented them with some trifling articles, which appeared to please them very much. On the 19th we continued our voyage, anchoring in 5 fathoms of water. As we found an abundance of good wood we continued here until the 25th, when we proceeded on our voyage, passing two creeks called Sungaro-Yacu and Puca. We found from 2 to 3 fathoms of water, and at night we anchored in front of a creek called Samana. On the 26th we had to anchor, not finding more than a fathom and a half; but on the 27th, the river having visibly risen, we passed a creek called Llulla Rehes. At half-past 6 we entered the river Palcazu, anchoring in 4 fathoms of water, and at a short distance from its confluence with the river Piches.

"From the mouth of the Pachitea up to this point we calculated the distance to be 204 miles. The scenery of the Pachitea is beautiful. Its width is variable, with a current of about 6 knots and a strong bottom. Its forests contain many valuable productions; some very easily to be obtained. This river is inhabited by four distinct tribes of Cashibos, and as yet no traveller or merchant has dared to enter amongst them.

“By this time we had navigated as far as it was possible, with a vessel of the tonnage of the *Morona*, and were within two hours’ run of the Port of Mayro, which it was our desire to reach. Not being able to proceed, the two small steamers were despatched with the Prefect and his staff, and in a few hours reached Mayro, where a communication was immediately despatched to the Government announcing the success of the expedition, the time necessary to go to Lima from Mayro being ten days, so that now a direct route exists between the Pacific and Atlantic Oceans.* It is announced in the periodicals of the Government that they intend to prosecute further the exploration of these important rivers, and are about to order to be constructed steamers expressly for their navigation at all seasons, with all the necessary accommodation for passengers and cargo.

“Having completed the expedition satisfactorily, the boats left for Yquitos, where we arrived on the 16th of February, having been absent three months and four days.”

* The distance of Mayro from the mouth of the Amazons is 3623 miles, and from Lima, by road, 325 miles.—[Ed.]

PROCEEDINGS

OF

THE ROYAL GEOGRAPHICAL SOCIETY.

[ISSUED JULY 23RD, 1867.]

SESSION 1866-7.

Twelfth Meeting (ANNIVERSARY), 1 P.M., May 27th, 1867.

SIR RODERICK I. MURCHISON, BART., K.C.B., PRESIDENT, in
the Chair.

THE Rules for the conduct of the Anniversary and the Minutes of the last Meeting having been read, Charles White, Esq., J.P., and C. H. Bracebridge, Esq., were appointed by the President as Scrutineers of the Ballot, to follow.

The following new Fellows were elected:—J. W. Barnes, Esq. ; Lieutenant J. B. Bewsher ; W. Bowell, Esq. ; J. Colebrook, Esq. ; E. J. Fraser, Esq. ; Captain Griffiths, 63rd Regiment ; the Marquis de Souza Holstein, Lord-in-Waiting to the King of Portugal ; Rev. F. W. Holland ; Rev. J. Holding ; Rev. W. V. Lloyd ; Rev. J. Milner, B.A. ; C. O'Leary, Esq. ; Lieutenant G. Purcell, R.N. ; O. St. John, Esq. ; Henry Stanton, Esq. ; Captain G. Tryon, R.N. ; Captain G. W. Watson, R.N. ; W. Rhys Williams, Esq., M.D. ; G. E. Wythes, Esq.

The Report of the Council was next read by the Secretary, C. R. MARKHAM, Esq. ; its adoption was proposed by the EARL OF SHEFFIELD, and seconded by B. COLVIN, Esq., and carried unanimously.

Vice-Admiral Sir GEORGE BACK then moved the following alteration in Clause 7, Chapter I. of the Regulations:—

That the words "And Fellows not applying within one year [for their copies of the Journal] shall only be able to procure such copies through application to the Council," be omitted.

Major-General Sir ANDREW S. WAUGH seconded the motion, and it was carried without a dissentient voice.

The PRESIDENT then proceeded to deliver the Royal Medals for the Encouragement of Geographical Science and Discovery. The FOUNDER'S MEDAL to Admiral ALEXIS BOUTAKOFF, for being the first to launch and navigate ships in the Sea of Aral,—an achievement which led to the establishment of steam-navigation on that sea and up the great River Jaxartes, into the heart of Turkestan; also for his subsequent successful survey of the chief mouths of the Oxus in the Khanat of Khiva. The PATRON'S MEDAL to Dr. ISAAC I. HAYES, for his memorable expedition in 1860-61 towards the open Polar Sea, wherein he attained a more northern point of land in Smith Sound ($81^{\circ} 35'$) than had been reached by any previous navigator.

Admiral Boutakoff was represented by Captain A. CROWN, of the Imperial Russian Navy; and the Hon. Mr. ADAMS, United States' Minister, received the Medal on behalf of Dr. Hayes.

After the presentation of the Medals, the PRESIDENT read his Annual Address on the progress of Geography. Admiral OMMANNEY then moved a vote of thanks to the President, with a request that he would allow it to be printed. Captain A. P. EARDLEY WILMOT, R.N., seconded the motion, which was put to the Meeting by J. CRAWFURD, Esq., Vice-President, and carried with expressions of general approbation.

Sir WALTER STIRLING, Bart., and Sir J. E. EARDLEY WILMOT, Bart., also addressed the Meeting, expressing their sense of the great services rendered by the President to the cause of Geography.

The PRESIDENT replied, stating that this was the thirteenth time that he had to return thanks on such an occasion.

The Scrutineers reported the result of the Ballot for the President and Officers of the ensuing year; and the following gentlemen were then declared elected; the names *in italics* are those of the new Councillors, and those who change office:—

PRESIDENT: Sir Roderick Impey Murchison, Bart., K.C.B., F.R.S., &c.—VICE-PRESIDENTS: Vice-Admiral Sir G. Back, D.C.L., F.R.S.; Francis Galton, Esq., M.A., F.R.S.; Major-General Sir Henry C. Rawlinson, K.C.B., M.P.; *Major-General Sir A. Scott Waugh*, F.R.S.—TRUSTEES: Lord Houghton; Sir Walter C. Trevelyan, Bart.—SECRETARIES: Clements R. Markham, Esq., F.S.A.; R. H. Major, Esq., F.S.A.—FOREIGN SECRETARY: Cyril C. Graham, Esq.—COUNCIL: *Hon. H. U. Addington*; John Arrowsmith, Esq., F.R.A.S.; Major-General G. Balfour, C.B., R.A.; Samuel W. Baker, Esq.; Thomas H.

Brooking, Esq.; *John Crawford, Esq., F.R.S.*; *Right Hon. Lord Dufferin, K.G., K.C.B.*; *Commodore A. P. Wilmot-Eardley, C.B.*; James Fergusson, Esq., F.R.S.; *A. G. Findlay, Esq.*; *Right Hon. Sir Thomas F. Fremantle, Bart.*; *W. J. Hamilton, Esq., F.R.S.*; Captain Felix Jones (late I.N.); *Sir William Stirling Maxwell, Bart., M.P.*; Herman Merivale, Esq., C.B.; *Sir Charles Nicholson, Bart.*; Laurence Oliphant, Esq., M.P.; *Captain Sherard Osborn, R.N., C.B.*; *Captain George H. Richards, R.N.*; Viscount Strangford; Thomas Thomson, Esq., M.D., F.R.S.—
TREASURER: Reginald T. Cocks, Esq.

A vote of thanks was in conclusion moved by W. BOLLAERT, Esq., to the retiring Members of Council, the Members of Committees, the Auditors and Scrutineers. It was seconded by J. ARTHUR, Esq., after which the PRESIDENT said he was never better supported than by the gentlemen whose names had been read as retiring from the Council at the present Anniversary. He hoped those on the new list would be equally efficient, and that in years to come the Fellows would find that the Council had done its duty as well as on former occasions.

Mr. CRAWFURD, as a retiring Vice-President, acknowledged the vote of thanks, and expressed a hope that Sir Roderick would not retire from the Presidential Chair.

The resolution was carried unanimously, after which the Meeting separated.

PRESENTATION
OF THE
ROYAL AWARDS.

(At the Anniversary Meeting, May 27, 1867.)

THE Founder's Gold Medal is awarded to Admiral ALEXIS BOUTAKOFF, for being the first to launch and navigate ships in the Sea of Aral,—an achievement which led to the establishment of steam-navigation on that sea and up the great River Jaxartes, into the heart of Turkestan; also for his subsequent successful survey of the chief mouths of the Oxus, in the Khanat of Khiva. The Patron's Gold Medal to Dr. ISAAC I. HAYES, for his memorable expedition in 1860-61 towards the open Polar Sea, wherein he attained a more northern point of land in Smith Sound ($81^{\circ} 35'$) than had been reached by any previous navigator.

In presenting the Medals, the PRESIDENT first spoke as follows:—

“In estimating the advance of geographical knowledge, it is obvious that our allies the Russians have, by their numerous active scientific researches along and beyond their distant frontiers, thrown quite a fresh light upon the physical structure and orography of Central Asia; and in my address of this day I shall dwell upon points relating to this subject which I have not touched upon at former anniversaries.

“It is now my pleasing duty to announce that our Council has selected one of these explorers, that enterprising naval officer, Admiral Alexis Boutakoff, who in the year 1852 transmitted to us a modest account of his survey of the Sea of Aral, as the recipient of our Founder's Medal. That inland sea, though unknown to the ancients, was distinctly recognised by the Arabian geographers, from the year 600, as the Sea of Kwarezm. In the middle and dark ages all knowledge of it was lost to the western world; and it was not until Russia, desirous of an accurate exploration of her Asiatic frontiers, sent, in 1825, an expedition to examine its shores,

under General de Berg, that any real acquaintance with its condition was obtained.

“It was only, however, when ships built at Orenburg were transported in pieces across the wild steppes, that Captain Alexis Boutakoff launched the first flotilla on that sea, and after two years of navigation ascertained its outlines and depth, and the nature of the large islands within it.

“On a recent occasion Admiral Boutakoff has also laid before us a sketch of his able examination of the mouths of the Oxus, where that river empties itself into this inland sea.

“Again, it is still more important to dwell upon the other great services he has rendered to his country and the civilised world, in having proved that the Jaxartes of the ancients (the Syr Daria of the Asiatics), which flows into the northern end of the Sea of Aral, is a stream which steam-vessels can navigate for upwards of 500 miles above its mouth.

“It was by this discovery that a safe line of communication between Europe and China, through Western Turkestan, was first laid open to Europe; so that whilst Britain has had and holds her own high road to India and China by the ocean, Russia, after trading overland for centuries with Western China under great difficulties, owing to the intervention of barbarous and hostile tribes, has at length opened out for herself a course along which, by the interposition of small protective forts, she will have a safe trade through Turkestan with the Celestial Empire.

“Admiring as I do the great progress made by Russians in advancing our knowledge of the geography of Central Asia, I have a peculiar satisfaction in knowing that our Founder’s Medal has been decreed to one who is so good a type of those enlightened explorers.

Turning to the Russian officer appointed to receive the medal, the President continued:—“Though unable to be present himself, I rejoice that his place is taken on this occasion by a distinguished brother officer of the Imperial Russian Navy; and I therefore request you, Captain Crown, to convey this medal to Admiral Alexis Boutakoff, as the expression of our admiration of his deeds.”

Captain CROWN thus replied:—

“MR. PRESIDENT,—I beg to return thanks to the Royal Geographical Society on behalf of Admiral Boutakoff, for the honour they have conferred on him by awarding him this Founder’s Medal. Being myself a member of the Imperial Russian Navy, I cannot but feel proud at having been called upon by you, Mr. President, to

perform the pleasant duty of receiving from your hands this evidence of the high appreciation of Admiral Boutakoff's labours by the Royal Geographical Society, in a region which, even at the present time, is so very little known to the scientific world. The kind approval, which Admiral Boutakoff's works have met at the hands of an Institution so widely known and esteemed in Russia, and of which you are, Sir, the honoured President, will undoubtedly be a source of mutual advantage in the cause of science, and will encourage our Russian geographers to seek a closer acquaintance with your Society, by offering their works in a version more accessible to English scientific readers than the Russian language, so that you will be better able to follow and judge of the progress of geographical researches in Russia, as carried on by your sister institution in St. Petersburg; at the head of which, as you are well aware, is His Imperial Highness the Grand Duke Constantine. I shall lose no time in forwarding to Admiral Boutakoff this Medal, and I only regret that I cannot express his thanks to the Royal Geographical Society, and to you, Sir, in so admirable a manner as he would have done himself, if he were here."

The PRESIDENT next addressed the Hon. C. F. Adams, Minister of the United States, in the following words:—

"MR. ADAMS,

Eleven years have elapsed since the Royal Geographical Society did honour to itself by awarding a Gold Medal to your highly distinguished countryman the late Dr. Kane, for his discoveries in the Polar Regions, while in charge of an expedition generously fitted out in the United States to search for Sir John Franklin; and now I rejoice to say that I have to ask you, as the Representative of the great American Republic, to receive the Medal of our Patron, Queen Victoria, which has been decerned to another of your countrymen, Dr. Hayes, for having reached a more northern point of Arctic land ($81^{\circ} 35'$) than ever was attained by any previous explorer.

"Forming one of the previous expedition of the lamented Kane, who justly received the applause not only of your country but of the civilised world, Dr. Hayes was on that occasion the discoverer of a large mass of land forming the extreme western shore of Smith Sound, to which the name of Henry Grinnell, an enlightened citizen of New York, the mainspring of that expedition, was most appropriately attached. It is for carrying personal observations to a degree and a half further northward on land than on the previous occasion, and for having sighted the open Polar Sea from the western shore of Kennedy's strait, just as Kane's com-

panion Morton had done from the eastern or Greenland shore of the same, that our Council has most deservedly adjudicated to him our Patron's Medal.

"The scientific results of this expedition have been to a great extent made known in America, and the Smithsonian Institution has undertaken the publication of those important additions to our acquaintance with the natural history, terrestrial magnetism, and meteorology, as well as the geography of the Arctic Regions.

"In the meantime the unpretending volume of our Medallist, entitled the 'Open Polar Sea,' is written in so clear, manly, and attractive a style, as must render it very popular among all readers in the British Isles and America.

"Just as we know that our old Baffin first discovered and navigated in a very small craft the great bay separating Greenland from America, with which his name has ever since been connected, so the extremest point where these waters lead into what was called the 'Open Polar Sea' has been reached by the small American schooner of Dr. Hayes bearing the name of the 'United States.'

"In perusing the narrative of the hair-breadth escapes of this little vessel when beset by huge floating icebergs, the skill with which she was managed, the stern resolution and ability with which every difficulty by sea or by land was overcome, and the rich scientific fruits which were brought back, with the loss only of the able Mr. Sontag, who made most of the astronomical observations, I may well congratulate your Excellency on the success of a voyage which will ever be remembered among the many great exploits of your countrymen.

"I have now only to request you to convey this Victoria Medal to Dr. Hayes, with the request that he will accept it as the strongest proof we can offer of our just appreciation of his great merits."

Mr. ADAMS replied :—

"Mr. PRESIDENT,—It gives me great pleasure to be the medium of presenting to Dr. Hayes the honourable memorial which your Society has voted to him for his services in the cause of science. It is no part of my province to undertake to vaunt any of my countrymen ; but I will say that, in no part of the world will you find more people who watch with greater attention and admiration the brave enterprises for public objects which are undertaken in any part of the world. More especially by their natural connexion, in all the essential elements of civilisation, with this community, their attention is closely drawn to every movement which takes

place here; and following the admiration with which they see what has been done, there grows a desire to emulate the same themselves. It has been often objected to enterprises of this kind, that they can lead to nothing—that they are, in their nature, simply adventures in quest of things that are impossible. But, Mr. President, the same remark might have been made when Columbus first undertook his voyage to the West—to what, he did not know. He thought he might come out somewhere in far Cathay; but the result was, as often happens in life, an unexpected one—and the unexpected turns out to be of greater proportions than anything which had been anticipated. Thus it was that America was discovered, and the influence of that discovery upon the fortunes of the world remains yet to be fully measured. And so it has been with most of the adventures that have been started from the Old World for the discovery of that which was unknown. Very often the explorers do not arrive at what was anticipated; but then they attain to a great deal which was not expected, and which has at the same time proved of very great value. And more than that, and greater than all, this pursuit has led to the cultivation and development of high moral qualities in a class of men, who become themselves greater heroes and greater benefactors to the interests of the world than most conquerors who have been lauded in the pages of history. I therefore, Mr. President, accept this Medal with great pleasure, and I have no doubt that this marked testimony to the merits of one individual will be felt not only by him, but by all that class of individuals, who, at their own cost and expense, carried on his enterprise. It will, moreover, stimulate them to repeat such efforts in emulation of your countrymen, by which the bounds of science may still further be indefinitely extended.”

A D D R E S S

TO

THE ROYAL GEOGRAPHICAL SOCIETY.

Delivered at the Anniversary Meeting on the 27th May, 1867.

BY SIR RODERICK IMPEY MURCHISON, BART., K.C.B.,
PRESIDENT.

GENTLEMEN,

I meet you with the satisfactory announcement that great as was the number of our members at the last anniversary, it has since then considerably increased, and now amounts to 2120 Fellows.

I have also the satisfaction of reminding you that, thanks to the zealous and efficient services of our Assistant Secretary, Mr. Bates, the well-filled volume of the year has been, like the last, for some time in your hands.

The general observations on the progress of Geography which I shall lay before you in the following Address will, as usual, be preceded by brief notices of those of our deceased associates who have taken any part in geographical researches or publications, as well as by a review of the Admiralty Surveys prepared by Capt. Richards, the Hydrographer.

OBITUARY.

In justice to an eminent geographer who has been taken from us, I begin the sad record (much less heavy, however, than that of last year), with a notice of the career of

Sir George EVEREST.—This distinguished Indian surveyor and geographer was the son of Tristram Everest, Esq., of Gwernvale, Brecon, and was born on the 4th July, 1790. He began his scientific education at Marlow and completed it at Woolwich, where he passed a brilliant examination, and was declared fit for a commission at an earlier age than the limit fixed by the regula-

tions. Sailing for Bengal as an artillery cadet in 1806, the first important service in which he was engaged was in executing a reconnaissance survey of the Island of Java, for which duty he was selected by the famous Sir Stamford Raffles, during the occupation of the island by the British from 1814 to 1816. During this period Everest gained the friendship of our honoured associate Mr. John Crawfurd, who, happily, is still amongst us, after a distinguished career in the East, particularly in connexion with the Malay Archipelago.

On his return to Bengal, Everest was employed by the Government in various engineering works, particularly in the establishment of a telegraph system between Calcutta and Benares. It was not long, however, before he entered upon a service of more immediate connexion with Geographical science; for in 1818 he was appointed chief assistant to Colonel Lambton, the founder of the Great Trigonometrical Survey of India. It will not be considered out of place here, if I mention that this colossal undertaking owes its origin to the late Duke of Wellington, who recommended it and gave it his cordial support, selecting Colonel Lambton to carry it out. How much an accurate survey was needed was shown by the earlier results of the operations, an error of 40 miles being detected in the breadth of the peninsula as previously laid down.

Captain Everest was first employed in the triangulation of the eastern part of the Nizam's dominions, where the unhealthy climate and close application to his duties so affected his health that he was ordered to the Cape of Good Hope to recruit. He did not, however, remain idle, for he employed his leisure in investigating the circumstances appertaining to the Abbé de la Caillé's arc, and his researches formed the subject of a paper, published in the first volume of the 'Transactions of the Astronomical Society.'

On the death of Colonel Lambton, in 1823, Captain Everest succeeded to the vacant post of Superintendent of the great Survey. He applied himself with such unremitting ardour to the extension of the great arc series of measurements, that his health again gave way, and he was obliged to seek rest and change for a time in England.

In 1830 he returned to India, provided, by the liberality of the Court of Directors, with an equipment of geodetical instruments and apparatus for the continuance of the survey, in the construction of which the most skilful makers had been employed. He had made himself acquainted during his visit with the English Ordnance

Survey system, and with every modern improvement in geodetical matters that had taken place in Europe. Thus provided, and in the prime of life, Colonel Everest returned to his great task. In addition to the duties of Superintendent of the Trigonometrical Survey, he had now to perform those of Surveyor-General of India, to which office he had been appointed by the Court of Directors; a union of offices which vastly increased his labours.

Between the years 1832 and 1841 the measurements of the great arc were carried on, and in December of the latter year closed by the completion of the Beder base-line, a work accomplished by his chief assistant, Captain (now Sir Andrew Scott) Waugh. The whole Indian arc from Cape Comorin to the Himalayas was thus completed. These elaborate operations were fully detailed in Colonel Everest's work on the 'Measurement of two Sections of the Meridional Arc of India,' published in two quarto volumes in 1847; a work which gained for its author a high reputation.

In summing up the labours of Sir George Everest I cannot do better than quote the expressive words used when the Asiatic Society of Bengal nominated him an Honorary Member. "Of the many works executed under Colonel Everest's direction, the most important, and that by which he will be best known to posterity, is the northern portion of the great Meridional Arc of India, $11\frac{1}{2}^{\circ}$ in length. No geodetic measure in any part of the world surpasses, or perhaps equals, in accuracy this splendid achievement. By the light it throws on researches into the figure and dimensions of the earth, it forms one of the most valuable contributions to that branch of science which we possess, whilst, at the same time, it constitutes a foundation for the geography of Northern India, the integrity of which must for ever stand unquestioned. Colonel Everest reduced the whole system of the Great Trigonometrical Survey of India to order, and established the fixed basis on which the geography of India now rests."

After Sir George Everest's departure from India in December, 1843, and retirement from the service, his successor, Sir Andrew Scott Waugh, took an opportunity of paying a well-deserved compliment to his former commanding officer, by naming after him the highest mountain measured in the Himalayas—namely, Mount Everest, whose height is 29,002 feet.

At the conclusion of his active career in India, and on settling in England, it was quite natural that all scientific Societies should have wished to do honour to such a man. He therefore naturally became

a Fellow of the Royal Society, an active supporter of the Royal Institution, but especially was he appreciated by Geographers, inasmuch as he was for many years one of our most honoured associates in the Council of this Society, and one of the most distinguished scientific Geographers who ever held the office of Vice-President.

Professor Henry ROGERS was a distinguished Geologist of the United States, who for the last years of his life became quite naturalised among us, and was indeed Professor of Natural History in the University of Glasgow at the time of his death.

His chief work, entitled 'The Geology of Pennsylvania, with a General View of the Geology of the United States,' in 3 vols. 4to., was illustrated by so well-defined a map of the whole region of the United States, that even in this Society his name must be ever mentioned with respect.

Besides the delineation of the boundaries of all the principal geological formations in the States, his sections are most ably drawn in showing how the strata of the Apalachian chain have been folded over and over, and how the whole have been violently affected, and in many cases reversed in their order, particularly in contact with igneous and metamorphic rocks of the eastern seaboard.

The Rev. George Cecil RENOARD, Rector of Swanscombe, near Rochester, who died on the 15th February last, in his eighty-seventh year, was one of the oldest Fellows of our Society, and during ten years (1836 to 1846) acted most efficiently and zealously as Foreign Secretary. In early life, after leaving Cambridge, he fulfilled the duties of Chaplain to the British Embassy at Constantinople; and, after an interval in England, went back to Turkey as Chaplain to the Factor at Smyrna, which appointment he held to 1814. On returning to Cambridge, he was elected Professor of Arabic in that University. His acquaintance with the geography and languages of the East rendered him a most leading and useful member of the Asiatic and Geographical as also of the Syro-Egyptian and Numismatic Societies.

In regard to his incessant labours to correct and improve all the publications in our volumes which related to Comparative Geography, or to Asiatic and African subjects, I can bear full testimony that this good and learned man laboured successfully for others in the advancement of knowledge, without looking for praise or endeavouring to gain any reputation for himself. As an editor his per-

spicuity was invaluable, as shown by all the papers on classical or critical Geography which passed through his hands.

His kindly manners and true modesty endeared him to every one of the Council with whom he acted, and when he spoke on any moot point, he was as logical in his deductions as he was accurate in his facts.

An excellent parish priest, he united the utmost purity of life with a simple and guileless nature, chastened by a feeling of reverence as deep as it was real; for, disliking metaphysics, he always maintained that Faith has its own high region whither Reason cannot follow it.

Sir STUART DONALDSON, who died on the 11th of January, 1867, was brought up to commercial pursuits, his brother the late Dr. Donaldson, Head Master of the School at Bury St. Edmunds, having been one of the most accomplished scholars of our day. At an early age he went to Mexico, where he remained some years, and acquired a knowledge of the Spanish language, which he spoke with fluency. About the year 1830 he went to Australia, and was engaged at Sydney as a merchant for many years.

On the establishment of Representative Institutions in the colony he became a Member of the Legislature, in which, being a ready and successful speaker, he took a prominent place. When responsible Government was set up in the Australian Colonies (1856) he became Colonial Treasurer, and on his return to England, in 1859, he received the honour of knighthood. Among his good deeds he is to be remembered as one of the original Members of the Senate of the University of Sydney, in the foundation and conduct of which he took, as I am informed by Sir Charles Nicholson, a very important part, as well as in other colonial establishments.

When he came among us here, we who knew him became soon attached to him, for his warm, cheerful, and genial manner; whilst at our convivial parties his fluency and energy as a speaker will be always remembered. In short, both in Australia and at home, this open-hearted, generous man has left many friends to deplore his loss in the prime of life, and when he was striving to obtain a seat in the British Parliament.

It is not within my province to endeavour to do justice to the various claims which many other deceased Fellows have unquestionably had to public recognition, irrespective of geographical science and researches. A mere enumeration, however, of the names of

those who have been taken from us, many of whom were of high reputation in other spheres, will indicate how well the Royal Geographical Society is supported by men of all classes in the British dominions. In this melancholy list are the following:—The Marquis of Camden, K.G., D.C.L., one of our original members; the second Marquis of Lansdowne, son of our much lamented Founder; Lord Northbrook, well known as Sir Francis Baring, M.P., who, when First Lord of the Admiralty, was a good supporter of Arctic exploration and Lady Franklin's efforts; Mr. T. Alcock, formerly M.P.; Mr. Joseph Beldam; Mr. Charles Bathoe; Captain John Chapman, R.A.; Mr. Daniel Clark; Mr. John Dobie, R.N.; Mr. George Dollond; Mr. Peter Dickson; Sir Alexander P. Gordon-Cumming, Bart., of Altyre; Mr. J. Gilchrist; Mr. Charles Pascoe Grenfell, many years M.P.; Mr. Robert Carr Glynn; Major J. F. Napier Hewett; Mr. Jacob Herbert; the Rev. C. Hudson, the ardent Alpine explorer, who lost his life on the Matterhorn; Mr. F. S. Homfray; Mr. R. Hanbury, M.P.; Captain Clement Johnson; Commander Jones-Byrom, R.N.; General Sir Harry Jones, G.C.B., a highly-distinguished officer of Engineers, and lately Governor of the Royal Military College; Mr. C. H. C. Plowden; Mr. Thomas Phinn, Q.C., formerly M.P., and latterly Judge-Advocate of the Fleet, and Councillor of the Board of Admiralty; Major Patrick Stewart, distinguished for his engineering services under Lord Clyde in the Indian war, and also in the laying down of the great telegraphic line through Persia to Hindostan; Mr. J. F. Pike Scrivener; Mr. H. S. Dazley Smith; the Rev. W. Brownrigg Smith, M.A.; Mr. John Stewart; Mr. Alexander Trotter, the brother of the lamented explorer of the Niger; Mr. John Taylor; Mr. Thomas Vardon; Mr. C. Willich; and the Right Hon. John Wynne.

ADMIRALTY SURVEYS.*—The Admiralty Surveys both at home and abroad have been carried out during the past year with energy and success, and the results compare favourably with those of any preceding year. The following sketch will convey an idea as to how the force has been distributed, and the amount of work which has been accomplished.

Coasts of the United Kingdom.—Captain E. J. Bedford, with his three assistants in the *Lightning*, have been employed in the Bristol Channel. They have completed a new Survey of Cardiff Roads and

* By the Hydrographer, Captain G. H. Richards, R.N.

its approaches on a scale of four inches to the nautical mile, and have done much towards correcting the Chart of the upper portion of the Channel in the vicinity of the Welch Grounds, where great changes had been found to have taken place since the Surveys of 1847-9. This work is still in progress.

Staff-Commander E. K. Calver, with his two assistants in the *Porcupine*, has been employed in making a minute examination of the eastern coasts of the United Kingdom, with a view to correcting the charts and revising the Sailing Directions to meet the constant changes which are occurring on these shores. Five hundred and thirty miles of coast between Cape Wrath, the north-westernmost point of Scotland, and the River Humber, have been so examined, and the entrances of the rivers Tay, Blyth, Tees, and Humber, where very considerable changes were found to have taken place, have been entirely re-surveyed. During the progress of this work a dangerous sunken ledge off Tarbet Ness—the promontory which separates the Dornoch Firth from the Bay of Cromarty—has been discovered and placed on the charts.

Channel Islands.—Staff-Commander John Richards, with one assistant, has completed the coast-line of the Island of Jersey, and has constructed on a large scale a plan of St. Helier's Bay, to enable the island authorities to improve and extend their present limited harbour accommodation.

The exceptionally rocky nature of the shores of the Channel Islands, the many off-lying dangers, the strength of the tides, and the general intricacy of the navigation, render the progress of this important survey necessarily slow, and much remains to be done before we can supply a complete and satisfactory chart of the whole group with their approaches. Surveys of most of the islands, however, are already separately published.

Portsmouth.—A small party with a steam launch has been employed on the Bar, Spithead, and its neighbourhood, during the past year. The deepening of the entrance by artificial means, and the numerous works in progress, have rendered it necessary that a constant watch should be kept to detect the least changes which may possibly take place. Commander Brooker, in conjunction with Mr. Hall, Master R.N., which latter officer succeeded in August last to the charge of the survey, has made a minute examination of the Bar on a scale of 60 inches to the mile; and it is satisfactory to find that the extra depth of between 6 and 7 feet water, which was obtained by dredging two years since, is fully maintained.

Foreign Surveys.—Mediterranean.—The *Hydra*, under Captain Shortland, has been employed during the past season in making a new survey of the Malta Channel, which has involved a minute triangulation of the south and east coasts of Sicily, the accurate determination of the various shoals, with elaborate soundings. This work is still in progress, and it is hoped will be completed during the present year.

China Sea.—This Survey which is under the charge of Mr. J. W. Reed, Master R.N., in the *Rifleman*, extends from the Equator to the parallel of Hong-Kong, including the various passages southward and eastward of Singapore, together with the main and Palawan routes. The whole region is encumbered with innumerable reefs and shoals, and although very much has been done towards determining their true positions, by the many eminent Surveyors who have been for years employed by the Admiralty on this service, no less important to all maritime nations than to Great Britain, much still remains to be completed before we can consider the routes to China free from danger.

Mr. Reed and his officers have been profitably employed during the past year in examining the reefs and shoals in the main route. They have surveyed the St. Esprit Shoal, between the Paracels and Hong-Kong, the Fiery Cross or Investigator Reef off the North-west Coast of Borneo, and determined the true positions, or expunged from the Chart those of many other hitherto doubtful dangers.

North China and Japan.—It was stated in our last Annual Report that the *Swallow*, employed for four years on this Survey, was on her way to England, and was to be relieved by another vessel. The *Sylvia*, under Commander Brooker, has since left England on this duty. The Survey comprises a very extensive field of new, or, at any rate, little known ground, towards which trade is now rapidly advancing.

The labours of the Surveyor have always been, and always must be, the precursor of Commerce; and Japan, Formosa, the Korea—the islands of the Eastern Archipelago—will long afford scope for his energy and talent. The vast Empire of Japan, indeed, has the outline of its shores fairly represented on our Charts upon the authority of its own ingenious geographers, and its principal ports to which we are at present admitted have been surveyed by ourselves; but there is still a void which the annual record of disasters too clearly confirms, and which, if ancient custom is adhered to, it will

remain for us to fill up. As to the Korea, it is at present almost a sealed book.

The *Serpent*, a ship of war under the orders of the Commander-in-Chief in China, commanded by an able surveying officer, Commander Bullock, performs also the duties of an auxiliary surveying vessel when necessary, or the exigencies of the service will admit; and many valuable contributions to the hydrography of the China Seas have been received from Commander Bullock, more especially connected with the coasts of Japan.

Straits of Magellan.—It was also stated in our last report that in withdrawing the second vessel from the Mediterranean Survey now approaching completion, it was the intention of the Admiralty—considering the importance of this Strait as a line of steam communication between the Atlantic and Pacific Oceans, and the comparatively little that was known of those extensive channels leading northwards into the Gulf of Peñas from its western entrance—to undertake a thorough examination of this region. The *Nassau*, commanded by Captain Mayne, sailed accordingly from England on this service in the fall of the past year, and, from our latest information, had commenced her work under favourable circumstances and with the cheerful co-operation of the Chilian Government.

West Indies.—This Survey, which is carried on by hired vessels and boats, has been in abeyance during the last year, owing to the officers who had been many years employed on it having returned to England. It has, however, been resumed under its former commanding officer Mr. Parsons, Master R.N., who, with two assistants, now commence the Surveys of Barbadoes and Montserrat.

Bermuda.—A small surveying party under Mr. Langdon, Master R.N., has been for some time engaged in sounding the various channels between the reefs of this group, the increased draught of water of our ships rendering diving operations occasionally necessary to remove coral patches.

The *Gannet*, a ship of war on the West India Station, commanded by an experienced surveying officer, Commander Chimmo, is also engaged in surveying operations, when other duties will permit. Commander Chimmo has, during the past season, completed the survey of the Gulf of Paria and other portions of the Island of Trinidad, and made large plans of the entrance known as the “Serpent’s Mouth,” and the anchorage of San Fernando.

The *Gannet*, and gunboat *Minstrel*, under Commander Chimmo,

assisted by Mr. Scarnell, Master R.N., have completed the soundings of the Bay of Fundy, and thus brought to a close the survey of Nova Scotia.

Newfoundland.—This survey, under Mr. J. H. Kerr, Master R.N., and carried on in a hired vessel, has made steady progress during the last year. Mr. Kerr and his assistants also rendered essential service to the expedition which laid the Atlantic cable of 1866, by buoying the course of the cable, and by piloting and assisting with their local knowledge the squadron which assembled in Trinity Bay on that occasion.

British Columbia.—Mr. Pender, Master R.N., in charge of this survey, with two assistants, has been employed during the past year, with a hired vessel, in surveying the intricate and hitherto little known channels between the north end of Vancouver Island and the northern boundary of the British possessions, in $54^{\circ} 40' N.$ lat., and has made good progress with this work; he has also surveyed the bar and harbour at the eastern entrance of the Skiddegate Channel in Queen Charlotte Island, as well as made plans of several useful anchorages, not before known, on the shore of the mainland. The bar at the entrance of the Fraser River has also been re-surveyed, in consequence of material changes which had occurred in the depth and direction of the channel.

Cape of Good Hope.—The survey of the shores of this Colony has rapidly advanced towards completion under Staff-Commander Stanton, during the past year; and, with the assistance of H.M.S. *Rapid*, Commander Stubbs, afforded him by Commodore Caldwell, the soundings between Storm River and Cape Recife have been satisfactorily completed.

Colonial Surveys.—Victoria.—Captain Cox having retired from the charge of this survey, after a long and useful service of more than thirty years in the surveying branch of the profession, has been succeeded by Commander Wilkinson, who, with his assistants during the past year, has made considerable progress in the survey of the exposed outer coast of this part of Australia—having completed from Port Phillip westward to within a league of Cape Otway. The Government of Victoria have wisely placed the Colonial steamer *Victoria* at Commander Wilkinson's disposal for this duty during the last few months, the advantage of which over the former system of working in a small sailing-vessel is apparent in the increased progress of the survey; and should it be found practicable to continue this advantage to the surveying officers, we may expect at no distant

time to have the whole seaboard of this colony completely and satisfactorily surveyed.

New South Wales.—Captain Sidney, in charge of this survey, has, with his two assistants, made very good progress during the past year. The coast between Sydney and Port Stephens, a distance of 86 miles, has been very carefully examined and charted. A re-survey of the harbour of Newcastle, rendered necessary by the changes in the banks and channels, has also been made, and the harbour of Port Stephens has likewise been completed.

Queensland.—The progress of the regular survey of the coasts of this colony has been somewhat interrupted, owing to changes among the officers; Staff-Commander Jeffery has retired from the charge of the survey, and his assistant been transferred to another colony. Mr. Bedwell, Master R.N., has succeeded to the charge, and without any assistant has completed 60 miles of the shores of Moreton Bay, and sounded over 180 square miles of ground.

Any loss of time, however, which has been sustained through the causes above named has been more than compensated for by the energy and ability of Commander Nares, of the *Salamander*, who, while employed on special service between Brisbane and the new settlement of Somerset at Cape York, has lost no opportunity of adding to our hydrographical knowledge of those parts of the Eastern coast of Australia which had only been partially examined before; and since our last report Commander Nares has surveyed the eastern coast of Hinchinbroke Island, the Palm Island Group, and Cleveland Bay.

The examination of the southern and eastern shores of the Gulf of Carpentaria by the *Salamander* was postponed during the last season, from press of other duties; but it has probably been carried out ere this.

South Australia.—The little vessel employed on the survey of the coast of South Australia had, as stated in our last year's report, been transferred for a very considerable time, at the request of the Colonial Government, to the north and north-western coasts of Australia in connection with the formation of new settlements. Latterly Mr. Howard, Master R.N., who was in charge, together with his assistant, Mr. Guy, have been able to add considerably to our knowledge of these shores, and have charted the coast between Cape Croker, the north-east point of Coburg Peninsula and Cape Stewart, a distance of 250 miles. All this coast has been fairly sounded and several new dangers accurately determined and laid down, as well as detailed

plans made of Mountnorris Bay and the Liverpool River. The vessel has now returned to Adelaide, and Commander Hutchison, having resumed the charge of the survey, has commenced his work on the eastern side of Spencer Gulf, 70 miles of the coast of which, southward of Cape Elizabeth, including a plan of Port Victoria, have been already completed.

Summary.—During the year 1866 sixty-eight new charts have been engraved and published, noteworthy among which is that showing the Agulhas Bank and the coast of the Cape of Good Hope from Hondeklip Bay to Port Natal. Upwards of 1050 original plates have been added to and corrected, and 168,900 charts printed.

Sailing Directions for the approaches to the China Sea and Singapore, by the Straits of Sunda, Banka, Gaspar, Carimata, Rhio, Varella, Durian, and Singapore, as well as the annual light books, tide tables, and azimuth tables, have been published.

CONTINENTAL PUBLICATIONS.—Independently of the Societies established in many of the capitals of Europe for the promotion of Geographical Science, the chief source of information has been, as in former years, Perthes' 'Geographische Mittheilungen,' so ably conducted by our Honorary Associate, Dr. A. Petermann. Although the past year appears not to have been remarkable for any great discoveries in our science, many memoirs of considerable interest have been published in this important serial. Amongst those more especially deserving of mention is an article entitled 'Das Nordlichste Land der Erde' (1867, Part v.), which contains a *resumé* of the geographical and cartographical results of all the North Polar Expeditions in the neighbourhood of Baffin's Bay from 1616 to the last journey of our Medallist, Dr. Hayes, in 1861. The paper is illustrated by an excellent comparative map, which gives a clear view of the successive additions to our knowledge of this portion of the Arctic regions. A memoir by the well-known Siberian explorer and naturalist M. Radde, is also well worthy of especial mention, describing the chief results of his travels and botanical researches in the Caucasus in the year 1865. This, together with a memoir by Otto Finsch, 'On the Geographical Distribution of Parrots' ('Mittheilungen,' 1867, Part i.), illustrated by a map, coloured to show the ranges of the genera and families, furnish striking examples of the close connection of botanical and zoological distribution with our favourite science. Other papers worthy of attention are, Payer's 'Investigation of the Ortler Alps;' Colonel E. von Sydow's

View of European Cartography in 1865 and 1866 ; an article by the learned Editor, advocating warmly the establishment of a German Society for the promotion of geographical expeditions ; and, lastly, 'Altitude measurements of the Rocky Mountains in Colorado Territory,' in which it is shown that Pike's Peak and other culminating points are exceeded in height by peaks in the Sierra Nevada range of California, as measured by the Geological Survey of that State.

Grundemann's Missionary Atlas.—A special Atlas devoted to the illustration of the Geography of Protestant Missions, and compiled by Dr. Grundemann, is now in course of publication, in German and English editions. The first parts, containing maps of several districts on the West Coast of Africa, have already appeared, and the work seems likely to prove very useful to all those who are interested in the progress of missions in little-known parts of the world, especially as the maps contain much detail and are in a convenient and portable form.

AFRICA.—*Dr. Livingstone.*—During the last few months our thoughts have been directed, with painful interest, to the last enterprise of our eminent associate, Livingstone. For reasons which I have explained at our evening meetings, and also through the public press, I have never admitted that there existed any valid proof whatever of the death of that great traveller. And now that Arab traders have arrived from a spot close to the reported scene of the murder, long after the event was said to have taken place, and brought to the Sultan of Zanzibar the intelligence that he had passed safely into the friendly Babisa country to the westward, and that a report has arrived at Zanzibar that a white man had reached the Lake Tanganyika, we have fresh grounds for hoping that he may now be pursuing his journey in the interior. In truth, we have recently obtained good evidence of the mendacity of the man Moosa, on whose statement alone the death was reported—it being known that he has given one version of it to the Consul and Dr. Kirk at Zanzibar, and also to the British resident at Johanna, and an entirely different one to the Sepoy examined, on his return to Bombay, by Colonel Rigby. We have, therefore, the strongest grounds for disbelieving the story altogether, and for hoping that our great traveller has passed safely through the intermediate country and reached the Lake Tanganyika, the great object of his mission.

Already Livingstone, by crossing the northern end of his own

Lake Nyassa, has determined one important point in respect to the watershed of South Africa, for he has proved, according to Dr. Kirk, that this great sheet of water here terminates, and is not connected with the more northerly Lake Tanganyika. If he has been spared, as we all hope, he has before him as grand a career as was ever laid out before an African explorer, it being now probable that Tanganyika, a fresh-water sea which must have an outlet, is connected on the north with the Albert Nyanza of Baker and others belong to the Nile system. For although Burton and Speke estimated the height of Lake Tanganyika to be little more than 1800 feet above the sea—the Albert, or lower lake being, according to Baker, 2720 feet—many persons, mistrusting the results obtained by the use of a bad thermometer, still think it probable that the Tanganyika may communicate through a gorge in the mountains at its northern end with the Albert Nyanza of Baker; for both these waters lie in the same meridian.

Pursuing this subject, our associate Mr. Findlay, after a comparison of the altitude observations of Burton and Speke, on the first East African expedition, those of Speke and Grant on the second, and of Baker on his great journey to the Albert Nyanza, has prepared a memoir in which he endeavours to prove that these various altitudes are not inconsistent with Tanganyika being the furthestmost lake of the Nile system, with an exit into Albert Nyanza. This important argumentative memoir will be read to us at our first meeting after the Anniversary.

For myself, I give no opinion on a question which, like many others respecting African geography, can really be decided by positive survey only. Let us, then, trust that Livingstone has been enabled to solve this singularly interesting problem.

In the mean time, not believing in the death of Livingstone on the sole testimony of one of his cowardly baggage-bearers who fled, and who has already given different versions of the catastrophe, I am sure the Society and the public will approve of the course I recommended, and in which I was cordially supported by the Council, and, to their great credit, by Her Majesty's Government, namely, to send out a boat expedition to the head of Lake Nyassa, and thus ascertain the truth. If by this exhaustive search we ascertain that, sceptical as we are, the noble fellow did fall at that spot where the Johanna man said he was killed, why then, alas! at our next anniversary, it will be the sad duty of your President, in mourning for his loss, to dwell upon the wondrous

achievements of his life. If, on the contrary, we should learn from our own envoys, and not merely from Arab traders, that he has passed on into the interior (and this we shall ascertain in six or seven months), why then, trusting to the skill and indomitable pluck of Livingstone, we may feel assured that, among friendly Negro tribes, who know that he is their steadfast friend, he may still realize one of the grandest geographical triumphs of our era, the connexion of the great Tanganyika with the waters of the Nile system.

But even here I would have my countrymen who are accustomed to obtain rapid intelligence of distant travellers not to despair if they should be a year or more without any news of our undaunted friend. For, if he be alive, they must recollect that he has with him a small band only of faithful negroes, no one of whom could be spared to traverse the wide regions between Lake Tanganyika and the coast. Until he himself reappears—and how long was he unheard of in his first great traverse of Southern Africa!—we have, therefore, little chance of knowing the true result of his mission. But if, as I fervently pray, he should return to us, with what open arms will the country receive him! and how rejoiced will your President be, if he lives, to preside over as grand a Livingstone festival as he did when this noble and lion-hearted traveller was about to depart on his second great expedition.

The party which I have announced as about to proceed to Eastern Africa, to procure accurate information concerning Livingstone, will be commanded by Mr. E. D. Young, who did excellent service in the former Zambesi expedition, in the management of the *Lady Nyassa* river-boat. With him will be associated Mr. Henry Faulkner, a young volunteer of great promise, and two acclimatised men, one a mechanic and the other a seaman. The expedition, I am happy to say, is warmly supported by Her Majesty's Government, and the building of the boat is rapidly progressing under the orders of the Board of Admiralty. The boat will be a sailing one, made of steel, and built in pieces, no one of which will weigh more than 50 lbs., so that the portage of the whole by natives past the cataracts of the Shiré will be much facilitated. The Government have arranged for the transport of the party to the Cape, with the boat and stores, by the African mail-steamer on the 9th of next month.*

* To the credit of the Union Steam Packet Company the boat has been taken out free of charge. Whilst these pages are passing through the press, I learn that the party sailed from Plymouth on the 11th instant.—*June 12, 1867.*

Arrived there, one of our cruisers will take them to the Luabo mouth of the Zambesi, where the boat will be put together, and the party—having engaged a crew of negroes—will be left to pursue their noble and adventurous errand, by the Zambesi and the Shiré, to the head of the Lake Nyassa. On account of the heavy seas which prevail on the western or leeward side of that lake, the expedition will keep close to its eastward shore, hitherto unexplored, and it is expected it will reach Kampunda, at the northern extremity, by the end of October, and there ascertain whether our great traveller has perished as reported, or has passed forward in safety through Cazembe to the Lake Tanganyika.

Senegal.—In former Addresses I have had occasion to record the great services rendered to Geography by the enlightened Governor of the French possessions on the Senegal, Colonel Faidherbe, who has greatly extended our knowledge of the country along the banks of that river. The most advanced post of the French is Medine, near the cataracts of Felou, 600 miles from the mouth, up to which point the river is navigable, during the rainy months, for vessels drawing 12 feet of water. With a view to ascertaining the political condition of the countries beyond the eastern frontier, as also to fix accurately the geographical positions of places between the Upper Senegal and the Niger, an expedition was sent out by Colonel Faidherbe, in 1863, to traverse the distance between Medine and the important town of Segou, which had been visited by our own renowned traveller Mungo Park, sixty years previously. The mission was most ably and successfully carried out by Lieutenant E. Mage and Dr. Quintin of the French navy. Countries recently desolated by semi-religious wars carried on by Mussulman chiefs were traversed with great danger, and the positions of the route carefully laid down; the road taken being a *détour* to the north, after crossing the Senegal, by Diangounté, to Yamina, on the Niger, and thence by canoe to Segou. By this journey Lieutenant Mage has filled up a void in all maps of the region of the Upper Senegal, and corrected the positions of many places as previously laid down by Mungo Park and others; but the accuracy of our English traveller in the most important points is cheerfully acknowledged by his accomplished French successor, especially, for instance, in the position of Yamina, which Mungo Park fixed at $13^{\circ} 15'$, and Lieutenant Mage found to be $13^{\circ} 17'$ N. lat. The expedition returned to the mouth of the Senegal in June, 1866, and the

French Geographical Society in the present year has rewarded the courageous leader with one of its gold medals.

ASIA.—Whilst, with the exception of the probable settlement of the north end of Lake Nyassa by the last journey of Livingstone, little has been added in the past year to our stock of knowledge respecting Africa, much information has in the same period been elicited regarding the geography of Central Asia, particularly as respects the physical features of those vast northern portions of it which have been explored by the Russians, and the positions of places and mountain ranges laid down by our own surveyors to the north of British India.

At the head of the labours which have elucidated the comparative geography of this quarter of the globe, I place the two remarkable volumes produced by our distinguished associate Colonel Henry Yule, C.B., entitled 'Cathay and the Way Thither,' published by our active auxiliaries the members of the Hakluyt Society, and of whose productions our Secretary Mr. Clements Markham is the perspicuous editor. Although the student of the former condition of China and the surrounding regions has ever dwelt with profit and delight on the descriptions of the great traveller Marco Polo, as first brought under the notice of modern English readers by Marsden, and as since rendered so popular by the excellent work of M. Pauthier, it was left for Colonel Yule vastly to extend our acquaintance with the amount of information possessed by our ancestors in the mediæval centuries which succeeded to the epoch when the great Venetian lived. By gathering together in one collection various records of other travellers in the East, commencing with those of the quaint and original Friar Odoric of Pordenone, in the fourteenth century, Colonel Yule has not only satisfied the cravings of scholars, but has at the same time gratified geographers by the preparation of a most instructive map of Asia, such as it was when explored by those earlier travellers, and when it was ruled over by the different branches of the family of Chinghiz Khan.

The contrast between the statistical and political condition of Asia, particularly its central portion, in those days when mercantile men traversed it freely from Azof or from Tabriz to India and China, and the present time, when there exists so small an amount of land intercourse with Europe, is truly astonishing. In those days, and even as late as the sixteenth century, Samarkand, a city renowned as a

seat of Mohammedan learning, was frequented by embassies, including one from the King of Spain. Even our own Queen Elizabeth was so anxious in the first year of her reign to open out an intercourse by way of the Caspian with Persia and India, that she addressed a letter to "the Great Sophi, Emperor of the Medes and Parthians." It was then (1558) that Jenkinson, our English traveller, made the journey from Astrachan to Bokhara, passing by Urghendj.

Now, with the exception of Russia, whose mission in 1841 has been noticed in previous addresses, no European power has had any sort of intercourse with the truculent Emir of Bokhara, to whom much of this fine region is, alas! subjected. It has since been left to stray travellers, one of the last of whom is the enterprising Hungarian Vámbéry, to explain to the civilized world the real state of this region, once so important, and now so fallen through tyranny and misgovernment. No one can have read that author's sketch of the condition of the natives in either of the Khannats of Khiva or Bokhara without rejoicing that Russia has, through the energy of her Government, at last brought these barbarians to respect the frontiers of an empire which has established a safe line of communication between its own territories and those of China.

One of the most important statistical results of modern geographical research, and the employment of natural means to a great end, is the bringing into real use, for the first time in history, the River Jaxartes of the ancients (now called the Syr Daria), and navigating it with steamers from its mouth on the Sea of Aral for many hundred miles into Turkistan and Kokand. By this great feat, and by the erection of forts, Russia has established an entirely new and well-protected route between Europe and China, far to the north of that followed by travellers and merchants in the middle ages, which was from the south end of the Caspian.

England, holding as she does so high a maritime position among the nations, may reflect with satisfaction on her great eastern traffic with India and China, carried on by her own great road, the ocean; and, far from envying the recent opening out of this land and river route through Central Asia, she may be well pleased that her Northern allies should have a beneficial commercial traffic by caravans with those fertile regions of north-western China, with which, in fact, we never have had any intercourse, but with whom the Russians have traded for ages, though always until now with more or less impediment, due to the forays of the intermediate wild people, and particularly the Kokandians. The two great empires

of Russia and China seem, in fact, to be destined by nature to interchange commodities by land and river communications through Central Asia; and so long as the line of such commerce between them is separated, as it now is, from British India and its dependencies by mountainous, sterile, and snowy regions, impassable by modern armies, there never can be the smallest ground of jealousy on the part of Britain.

On this head I was much gratified, at our very last meeting, in listening to the able memoir of Captain Sherard Osborn on the actual state of Chinese Tartary, an enormous region that has become, through the relaxation of the Chinese hold, "no man's land," and in hearing from the eloquent author, as well as from the commentators on his Memoir, that, instead of any apprehension being entertained regarding the late Russian advances, it was generally felt that it would be greatly to the advantage of the natives, as well as to British power in India, that the influence of a civilized Christian nation should be extended eastward over a region now becoming desolate through misgovernment and lawlessness.*

These considerations lead me naturally to say a few words upon the geographical operations of our medallist Admiral Boutakoff, which have mainly led to the establishment of the new Russian line of eastern traffic, and which have justly obtained for him a high reputation. The first of these enterprises might almost be called the geographical discovery of the Aral Sea. For, although this great mass of salt water had been known to Arabian geographers during several centuries under the name of the Sea of Khwarezm, though its shores had been visited by travellers, one of whom was the accomplished Russian geographer George von Meyendorf, who described the mouths of the Syr Daria or Jaxartes, at its north-eastern extremity, and another, General Berg,† who led a Russian expedition along its western banks in the winter of 1825-6, no ship had ever sailed upon this inland sea. The first vessel launched upon it was constructed at Orenburg in 1848, and transported in pieces across the desert, and in it Boutakoff, after two years of navigation,

* The reader who wishes to become acquainted with the physical features and boundaries of the districts of Chinese Tartary, so well expounded by Capt. Sherard Osborn, and of which he prepared a large map, must consult Keith Johnston's Library Map of Asia, published by Mr. Stanford, in the preparation of which Mr. Trelawney Saunders took a leading part.

† See the first published notice of the remarkable expedition of General Berg in 1825, in the work of myself and coadjutors, 'Russia and the Ural Mountains,' vol. i. p. 310. General Berg is now Count de Berg, and the Emperor's representative in Russian Poland.

defined the real shape of the coast, established the depths of the sea, and was the discoverer of the large island in it, the wild antelopes of which came to stare with astonishment, yet without fear, at their first invaders.

Fifteen years have elapsed since I communicated the first important paper of Boutakoff to this Society, and it was spoken of with all the praise it merited in my Anniversary Address of the year 1853.* The successful exploration of the Jaxartes, and the discovery of its fitness for steam navigation, which was the next exploit of Boutakoff, led to the establishment of the great central route to China already mentioned, and Russia naturally availed herself of the commercial advantages thus presented in these natural features near the boundaries of her Asiatic possessions.

The question now arises, whether, by these enterprises, the honour does not truly belong to Russia of having, for the first time in history, defined the course of the Syr Daria and its exit into the Sea of Aral? The classical writers were, as I shall presently show, ignorant of the true geography of this region, particularly of its northern part, and an attentive consideration of its geological structure and physical outlines has led me, followed by the inquiries I have made among comparative geographers who have well studied the subject, to believe that their silence with respect to the Aral Sea is no proof that it has not existed during the whole of the historical era.

Holding this opinion, I necessarily differ from my friend Sir H. Rawlinson, who, in observations recently delivered from the chair of this Society † made a very ingenious statement, and gave it as his opinion that there was sufficient evidence to show that in early times, say from 600 years before the Christian era to 500 or 600 years after it, both the river Oxus and Jaxartes flowed into the Caspian, the Aral being non-existent. That afterwards, and up to the year 1300, they fell into the Aral, and that for the next two hundred years (1300 to 1500) they came back into the Caspian, subsequently flowing gradually back into the Aral and forming the Sea as we now know it.

Although I know that my colleague will admit that my geological data must have some weight, I have to claim his indulgence for venturing to question the views of so eminent a scholar respect-

* Journal Royal Geographical Society, vol. xxiii., President's Address, p. lxxxvi.

† See 'Proceedings,' Royal Geographical Society, 11th March, 1867.

ing the changes of physical features in this region that may have happened in the days of history. Supported, however, as I am by the opinions of men on whose knowledge I place great reliance, I must say that I cannot regard the Persian manuscript, which was presented to Sir Henry by a clever chief of Herat, to be a document of sufficient value to override the conclusions at which I have arrived on many independent grounds.

Concerning the ancient course of the Oxus, I see no reason to differ from the Persian writer and Sir Henry. But when it is stated that in the year A.D. 1417 the Jaxartes had deviated from its former course, and instead of flowing into the Caspian (as the ancients had it), joined the Oxus, and thus, the two rivers occupying one and the same bed, came into that sea, I must withhold my assent. This is a novel and striking statement, and before we attach credence to it we must have some physical evidence to sustain it. In my state of scepticism regarding the value of this Persian manuscript, now for the first time produced, that which strikes me *à priori* as a sign of its invalidity, is, that when this region was open to knowledge through the long-enduring reign of the civilised and literary Arabians (say from the 7th to the 13th century), the Aral was known and laid down as a distinct water-basin under the name of Sea of Khwarezm. On the other hand, when after that period knowledge became dim and local, and civilisation was at its lowest ebb, then it was that the Aral disappeared. My conclusion from this coincidence of the supposed emptying of the Aral, with the absence of records respecting it, would be that the sea had existed during all that time, but that there were then no geographers to record the fact.

In treating this subject, let us first consider the separation of the Aral from the Caspian as originally dependent on geological changes of the surface, and then proceed to estimate the value we are to attach to the writings of the classical authorities in reference to a region so very imperfectly known to them. As a geologist who has studied this Aralo-Caspian question *in situ* I beg to place on record in our Geographical volumes my view of the pre-historic physical outlines of a region which, with the exception of the obliteration of one mouth of the Oxus, has, I venture to think, undergone no essential change during the human period.

According to all good authorities, including Humboldt, there existed in the latest tertiary, or what some call quaternary times, a vast depression on the surface of the globe, extending over 8,000

square marine leagues, in which a great inland sea was accumulated, and which, in a work on Russia, my associates and myself first mapped out under Humboldt's name of Aralo-Caspian.* In that sea there lived an abundance of molluscous and other animals, all of species having a local and limited range, and all strikingly distinguished from the more numerous animals of oceanic seas. Now, owing to the upheaval of large portions of the bottom of that old inland sea, its animal contents formed, in a fossil state, the Steppe limestone, as seen at different levels over an enormous area. Owing to these pre-historic movements of the crust of the earth, these fossil remains are seen to occupy the strata on the banks of the lake of Aral, as well as on the shores of the Caspian Sea. They also occur at various places and at different heights in the adjacent Steppes, extending westward to the country of the Don Cossacks to the north of the Sea of Azof, where I have myself examined them. There is therefore no doubt that, in prehistoric times, the Aral and the Caspian, and also portions of a much wider region, now raised above them, were occupied by one vast internal and depressed sea, large portions of which have been desiccated. By these movements of elevation that part of the former great sea which became the Aral was elevated to about 117 ft. above the former western part, or present Caspian, and the seas thus insulated were separated through the same movements by the elevated plateau now called Ust-Urt.

This was the physical condition of the region long before tradition or history. Humboldt has well remarked that the great Aralo-Caspian depression had a similar origin to the much deeper cavity in the earth's surface occupied by the Dead Sea, though the one is only 83 feet and the other nearly 1300 feet beneath the Ocean. Now, if we endeavour to account theoretically for the low present level of the old Aralo-Caspian Sea by evaporation only, we are met by the facts that large portions of its former bottom have been raised to different altitudes in the surrounding region, and that the levels of the Sea of Aral and the Caspian are also different, and are separated by the great plateau of Ust-Urt. As it is impossible to explain the existence of the much deeper cavity of the Dead Sea except by a greater sinking of the earth's crust, so is such a phenomenon precisely what geologists would expect to see realized

* See 'Russia in Europe and the Ural Mountains,' vol. i. pp. 303-314, and particularly observe the map and section, p. 311, from the Sea of Azof across the Caspian and the Ust-Urt to the Sea of Aral.

as a natural and compensating result of the corresponding upheaval of the adjacent lofty mountains of Asia.

This being the conclusion at which geologists have arrived, let us see if it be interfered with by any reliable historical records. As to the knowledge possessed by Alexander, or his cotemporaries, it really does not touch the question of the relative courses of the Oxus and Jaxartes towards their mouths. For Alexander crossed the Oxus at about 400 miles above its mouth, and the most western point at which the great conqueror reached the Jaxartes was Cyropolis, where he passed it to defeat the Scythians; and that spot is about equidistant from the Aral Sea. Consequently, neither Alexander nor his generals could know anything of the real course of either river for great distances above their mouths. Scholars and comparative geographers doubt, indeed, if any weight can be attached to the unanimous statement of the Greeks, that both the Oxus and Jaxartes flowed into the Caspian, by mouths some 300 miles apart,* when they see how equally unanimous were the writers who came between Herodotus and Ptolemy in believing the Caspian to be but a gulf of the Northern Ocean! Again, we see how persistently the followers of Alexander confounded the Jaxartes itself with the Tanais, and fancied that they had doubled back upon the rear of Europe.

“The expedition of Alexander,” says Humboldt, “far from extending or rectifying the geography of the Caspian Sea, confounded the Tanais with the Jaxartes, and the Caucasus with the Paropamisus or Hindu Kush.”† Again, “It is through a singular combination of circumstances that the great Macedonian expedition, which in other respects extended the geographical horizon of the Western nations, became fatal to the geography of the Caspian Sea.”‡ Further on, he says, “Some traces of the Sea of Aral, described as a great basin to the east of the Ural or Jaik River, are indeed found in Menander, the Byzantine historiographer; but it is only with the series of Arabian geographers, at the head of whom, in the tenth century, we must place El-Istachry, that we first obtain a certain knowledge of the topography of these countries.”§

The truth is, that, when it was thus loosely said, that both the Oxus and Jaxartes flowed into the Caspian, we must make due allowance for the ignorance of the ancients of the northern portion

* 2400 stadia according to Eratosthenes, and 80 parasangs according to Patroclus, both quoted by Strabo.

† ‘Asie Centrale,’ vol. ii. p. 14.

‡ Ibid., p. 153.

§ Ibid., p. 156.

of this vast region, particularly of the course of the Jaxartes, which no one of them had fully explored, and at the mouth of which none of them had arrived.

If, indeed, we rely on the sagacious Rennell, he, in his great work on the 'Geographical System of Herodotus,' may be said to have established this point, for, in speaking of the old geographers, he says, "they understood the *Aral to be included in the Caspian*, since they knew but of one expanse of water in that quarter; for the Cyrus and Araxes, Oxus and Jaxartes, were all supposed to fall into the same sea." This he contrasts with the accurate subsequent knowledge of the Arabian geographers. And truly so, for this was the regular progress of observation, and a great advance over the ignorance of the classical writers respecting these hyperborean tracts. In those times the regions inhabited by the Massagetæ and the King of Kharasmia (the present Khiva) were barbarous countries, never explored by geographers; and, consequently, the classical authorities could only have obtained the little knowledge they possessed from native hearsay.

In his able essay on the 'Life of Alexander the Great,' Williams distinctly lays down, in his map of that period, the seas of the Aral and Caspian as distinct bodies of water. The same separation is given by Rennell, in his map of the twenty satrapies of Darius Hystaspes; and, whilst in it he indicates the Oxus flowing into the Caspian, and the Jaxartes into the Aral, he shows completely how the two seas were separated by what he terms the high plateau of Samob, the Ust-Urt of the present day.

Again, Thirlwall, in his 'History of Greece,' plainly leads us to believe that the Greeks could have known nothing of the region of the Sea of Aral and the mouth of the Jaxartes, except what they derived from the reports of the King of Kharasmia, who came from a distance in the north to visit Alexander. In short, there is no historical evidence whatever to oppose the view, that the outline and structure of the Aralo-Caspian region, as now seen, was determined, as I have said, long anterior to the historical era.

On the point of the prehistoric separation of the Aral from the Caspian, I entirely concur with Humboldt. "If we ascend," he says, "to the primitive condition of the vast Mediterranean concavity, I should be led to believe that, notwithstanding the diminution of surface which the Caspian and Aral basins may have undergone in the historical times, from Hecatæus and Herodotus down to the tenth century of our era—i. e. to the days of

the Arab geographers El-Istachry and Ebn Haukal—the event of the separation of the Aral and Caspian remounts to a geological epoch, which, like the separation of the Euxine and the Caspian, or the opening out of the Dardanelles and the Straits of Gibraltar, are all ante-historical, or far beyond any human tradition.”*

In sustaining this view it is to be remarked that, whilst the Aral Sea trends from north to south, the Syr Daria and its embanchment the Kuvan Daria, which flow into it from the east, have had courses at right angles to that sea itself; thus favouring the geological view that the great movement which produced the plateau of the Ust-Urt, separated the Sea of Aral from the Caspian, and left the chasm occupied by the Aral, was also accompanied (as is usual in such elevations) by transverse flanking openings in the mainland, on the east, along which those rivers flowed. In this view the parallelism of the Syr Daria to that of the Kuvan Daria, about 50 miles south of it, is remarkable.

If the Jaxartes ever flowed to the south-west, as suggested by Sir H. Rawlinson, it must have joined the Oxus long before the united streams fell into the Caspian, which is very distant from the nearest point of the valley of the Oxus. But if such an union of the great streams ever existed in so southern a latitude, it must have been perfectly well known to the ancients, and they have made no allusion to it. On the contrary, they believed and have stated, that the rivers fell independently into the Caspian, and by different courses, separated from each other by a wide interval.

Whilst I think that, probably, the many-mouthed Oxus always sent a large portion of its waters into the Aral, I also quite believe that one of the branches debouched formerly into the Caspian, as explained by Humboldt, and as proved indeed by the old English traveller Jenkinson, to whom he refers. It will also be presently seen that the distinguished Asiatic geographer Semenov would explain the desiccation of the former or Caspian branch of the Oxus in another manner. The stoppage of that watercourse (formerly an usual line of traffic) may also be accounted for by a local elevation of land in that latitude; for it is not remote from the scene of igneous eruptions that produced volcanic mountains, as the greater and lesser Balkan, near the ancient desiccated mouth of the Oxus. Such a change of level may, indeed, have been caused by the same subterranean

* Humboldt, ‘Asie Centrale,’ vol. ii. p. 146.

forces which, in this latitude, evolve, at the present day, the fires of Baku, and have recently thrown up volcanic mud-islands near the southern end of the Caspian. The elevating effect of these forces would deflect the Caspian branch of the Oxus and cause its waters to unite with the branches which flowed northwards into the Aral Sea.

The great distinction between the views taken by Sir Henry Rawlinson and myself is, that whilst I believe the main outlines of the Aralo-Caspian region were determined by movements of the earth in quaternary or later tertiary times, he refers the great changes which he believes to have been made in the courses of the Oxus and Jaxartes to no very distant historical dates; thus referring the emptying and refilling of the deep hollow in which the Aral Sea lies to comparatively modern times.

He offers, indeed, one argument, which, if sustained, would at once dispose of my view. In support of the opinion that the Aral Sea was non-existent in the thirteenth and fourteenth centuries, he states that in those days travellers from Europe to Asia passed over dry lands since occupied by that sea. If this were substantiated, the belief I have adopted that the separation of the Aral from the Caspian, and the upheaval of the broad intervening plateau of the Ust-Urt, would be at once removed from a pre-historic period to the days of Henry III. and the two first Edwards of English history.

Now, surely, if so great a terrestrial change of surface as this had happened in the thirteenth or fourteenth centuries, the rumour of it would have been bruited throughout Europe and Asia. Unwilling, however, to rest upon any notions of my own, I have consulted that admirable comparative geographer, Colonel Yule, as to the routes taken by the mediæval travellers of that date; and he having favoured me with much information respecting the whole of this subject, I extract from his letter the appended long note.* By reference to it the reader will see that no foundation for such an assertion is to be traced in the narratives of these old travellers. For even when the starting point of their journey eastward lay upon the Volga, their line of march is traced either quite to the south of the Aral through the lands of modern Khiva, or more to the north of that sea, and probably beyond sight even of its shores.

* After alluding to the little weight to be attached to the statements of the Greeks, tracing the imperfect accounts of Herodotus and his followers, and rejecting the Oxiana Palus of Ptolemy, which had been made "to do duty," as he says, for the Aral on many respectable maps, Colonel Yule proceeds to say:—

"We are on surer ground in the narrative of the Embassy of Zemarchus to the Khan of

In considering what changes have or may have occurred within the historic period, and quite independent of all former or geo-

the Turks about the year 570. The remains of the historian Menander, which relate this mission, are unfortunately but fragments, and do not say how Zemarchus got from Byzantium to Central Asia. But on his return route, which lay to the north of the Caspian, we are told that before reaching the rivers *Ich* and *Daich* (apparently the modern Emba and Ural) ¹ he passed for twelve days along the sandy margin of a certain *great and wide lagoon*. This looks very like the Aral; nor probably will Sir Henry Rawlinson deny its existence at that date. But I quote the allusion to show that even the Greeks, once they got actually to the site of the Aral, did recognise its existence.

"We now get to a period regarding which there is no controversy. A long *catena* of geographical works, as Sir Henry Rawlinson tells us, represents the two great rivers as falling into the Sea of Khwarezm, *i. e.* the Aral. But is it the case that this chain of testimony ceases with the year 1300? Among those quoted by Humboldt even are some of later date, such as Abulfeda and the Persian Hamdallah. It is the case, no doubt, that those Eastern geographers often copy what has been said by their predecessors centuries before; but a passage which Humboldt quotes from Hamdalla, a writer of the 14th century, appears to be original. It speaks of the Sea of Khwarezm (or Aral) as having a compass of 100 parasangs, and separated from the Caspian by a tract of 100 parasangs in width. It contains also the remarkable statement that only a *part* of the water of the Oxus then flowed into the said sea, which was fed also by the River of Ferghana (the Jaxartes) and others.

"Two centuries later, when the first English traveller ² reaches those regions, he finds the Aral in existence, though his account of it is but hazy; and when Russian geography springs up at the end of the 16th century, we find that it already knows the Aral well as the Blue Sea.³

"Knowing then, as we do, how many indications point to the existence in those regions in recent geological times of a great inland sea, and finding a tolerable chain of evidence as to the Aral itself—either positive or implicit—down to the days of modern geography, I feel it difficult to believe, on the authority of the Persian MS., that this great sea, nearly 600 miles in circuit, with precipitous sides and attaining a depth of 37 fathoms, did, for a number of years, entirely cease to exist, and then again became as we see it and as old Arab geographers had described it. I by no means desire to dispute that there may have been a material contraction of its area at the time when a considerable part, if not the main stream, of the Oxus flowed into the Caspian; but this is a different thing from its entire disappearance and desiccation.

"There is one argument on this subject urged by Sir Henry Rawlinson which I think a review of the facts in detail will scarcely bear out. He refers to that period during the 13th and 14th centuries when the vast extent of the Mongol domination threw open Asia, which for a succession of years was penetrated by envoys, missionaries, and adventurers, several of whose narratives have come down to us, and when a regular course of trade was established, regarding which we have many particulars.⁴ The route usually followed by those travellers, Sir Henry says, lay exactly across the site of the Sea of Aral; yet not one of them mentions it. If this were so indeed, it would be vain to maintain the *improbability* of what would be so clearly established as a fact.

"But let us glance at the routes followed by these travellers successively from the first of them in the middle of the 13th century. This was Friar John of Plano Carpini, sent on a mission from the Pope to the Great Khan in 1245-47. Friar John, though he

¹ "Perhaps, however, the *Ural* and *Ik*, so carrying the route north of Orenburg."

² "Jenkinson."

³ "See in Levchine's 'Description des Hordes et des Steppes des Khirghiz Kazaks,' in his dissertation on the Jaxartes, p. 462, a quotation from a Russian geographical work of the time named."

⁴ "Surely there is a *lapsus*, when Sir Henry Rawlinson speaks of these merchants as returning with the *tea* and silk of China; or, if he has grounds for including the former, it would be most interesting that they should be produced. In 'Cathay,' I have indicated the mention of tea by Ramusio's Persian friend Hajji Mahomed, as the first known to me in any European book."

logical changes, I necessarily attach great weight to the opinion I have recently obtained through my friend General Helmersen from

writes in the main like a man of sense and reading, is not a good geographer. He makes the Dnieper, the Don, the Wolga, and the Jaic all fall into the *Great Sea*, the '*Mare Magnum*, which has its issue by St. George's Channel at Constantinople;' and rides for many days along the shores of the Caspian, apparently under the impression that it is but a part of the Euxine.¹ We might ask, in passing, if there were no Friar Johns among the ancients capable of the more venial error of confounding the Sea of Aral with the Caspian? Be this as it may, there is no reason for carrying the route of Carpinì's party over the bed of the Aral. After crossing the Jaic, it lay for many days through the land of the *Cangitæ*, or Kankhlis, in which they found few people, but very many and large salt-marshes and lagoons, which they took to be the *Paludes Mæotides* of the ancients, and which probably were those which still exist to the north and north-east of the Aral.² They then enter the land of the *Bisermi*, or Mussulmans, and come upon the cities and cultivated lands of northern Turkestan.

"Friar William de Rubruquis, eight years later, is more correct in his notions of geography. He clearly discriminates the Caspian from the Euxine, and gives a fair account of it. He gives also the general orientation of his route, running due east from the Wolga for 45 days and then turning southward, and so continuing for eight days till he reached *Kenchak*, a city known to have been in the valley of the river Talas. If you protract this route as well as the data will admit, you will find that it entirely clears the Aral.³

"Another traveller, who visited the Court of Mongolia in the same year with Rubruquis, was King Hethum or Hayton, of Little Armenia. He, too, after visiting Batu Khan upon the Wolga, rides eastward across the Jaic; but, as he passes the Irtysh also, his route must have lain far to the north of the Aral. On his return he passed by Samarkand and Bokhara into Persia.

"Marco Polo himself never mentions the Aral, indeed; but neither does he mention the Jaxartes, and seems never to have been nearer either than at Kashgar. In the preliminary chapters of his book, in which he speaks of the journey made by his father and uncle from the Wolga to Bokhara, he unfortunately gives no particulars of their route,⁴ excepting that they went south from Bolghar to Ukak (near Saratov) before striking east.⁵

"Probably, however, it was the same as that laid down in the next century from the information of the merchants who had travelled it, by the Florentine factor Balducci Pegolotti, about 1330-1340. This route, followed by mercantile travellers bound for China, ran from Sarai, on the Wolga, to Saracanco, or Saraichik, on the Jaic, and thence in camel-waggons to URGHANJ, the capital of Khwarezm, which stood on a branch of the Oxus, about 60 miles south of the present embouchure of that river in the Aral Sea. From Urghanj the travellers were in the habit of proceeding to OTRAR, a few miles north of the Jaxartes, and not far from the modern town of Turkestan, and so forward to Almalik, near the Ili, the capital of the Khanate of Chagatai. They thus travelled distinctly *round* and not across the bed of the Aral. We are told, indeed, that if they had no merchandise to dispose of at Urghanj, they might save from 5 to 10 days by going direct from Saraichik to Otrar. If we lay down this direct route with geometrical and literal directness, it will indeed pass through the extreme north of the Sea of Aral. But even direct railway lines are not so straight as that; and there can be little doubt that Pegolotti's direct line was much the same as that followed by Carpinì and Rubruquis in the preceding century.

"The same route that Pegolotti recommends—viz., that from Sarai to Saraichik, and

¹ "See in D'Avezac's edition, p. 743."

² "See the narrative of Carpinì's companion, Benedict the Pole, in D'Avezac, p. 777."

³ "For a detailed examination of Friar William's route see '*Cathay and the Way Thither*,' p. cxi. *seqq.*'"

⁴ "The *Tigri*, or Tigris River, which Polo mentions as crossed by the party, was supposed by Marsden and his successors to be the Jaxartes; but Pauthier has clearly shown it to be the Wolga. (See his '*Polo*,' p. 8; also '*Cathay*,' p. 234.)"

⁵ Timur, invading Kipchak and Russia, went so far north as to cross the Tobol before crossing the Jaic.

M. P. Semenov, the President of the Physico-Geographical section of the Russian Geographical Society, who has distinguished himself by his researches in the Thian Shan chain of Central Asia. Whilst he rejects, like myself, the hypothesis of the great Aral depression having been emptied and refilled in the historical period, he refers the desiccation of the Asiatic rivers and the diminution of lakes to the decrease of glaciers in the high mountains, as well as to great evaporation. By these causes he thinks that at one period the Aral Sea may have been diminished, though he is firmly of opinion that such a deep depression could not have been emptied and refilled. In reference, however, to the former Caspian branch of the Oxus, in the existence of which he believes, he supposes that many streams, now dry or nearly so, formerly

thence to Urghanj and Almalik—was followed by Friar Pascal, of Vittoria, in 1337,¹ and (as far as Urghanj) by Ibn Batuta, a few years earlier, in travelling from Sarai to Bokhara.

"It was probably also the route followed by John de' Marignolli, on his journey towards Peking, in 1339-42; but, unfortunately, he says nothing whatever of his route between the two Mongol capitals of Sarai and Almalik.

"We have named all the travellers, as far as I am aware, that have left any record of their journeys in those regions during the period to which Sir Henry referred. None of them, we must acknowledge, say anything of the Aral Sea; but we see also that it cannot be maintained that they gave the practical disproof of its existence which would be afforded by their travelling dryshod across its bed! and the travellers' narratives were the bases of the maps to which Sir Henry has referred. The Catalan map does not, indeed, contain the Sea of Aral; but neither does it contain any hint of the Jaxartes. The great map of Fra Mauro, though it contains no Aral, represents the river Amu (or Oxus) as flowing into the Lake Issik-kul, which is, perhaps, an adumbration of some knowledge of its discharge into another sea than the Caspian. The traditions of geographers are hard to correct. I do not know what map first shows the Aral under anything like its proper conditions. Many years after the date of the Russian geography to which we have alluded as so clearly indicating the Aral under the name of the Blue Sea, we find John Blaeu, in his great atlas (1663), representing the Jaxartes as flowing into the Caspian, and a duplicate of the same river, under the name of *Sur*, flowing by Tashkend into the 'Lake of Kathay,' with a difference of 30 degrees of longitude between the two! Even Petis de la Croix, in the maps (sometimes singularly happy) which illustrate his translation of the History of Timur, has no indication of the Aral.

"There is, indeed, one mediæval map which at first sight seems to bear strong testimony to the existence of the Aral Sea in the beginning of the 14th century. I mean that curious one executed by the old Venetian Marino Sanudo, and submitted by him to the Pope and King of France, about 1325, with his grand scheme for the destruction of the Mohammedan power. This map exhibits very clearly a *Mare Yrocanum*, *Caspis* or *de Sara*, in the proper position of the Caspian. It is connected by a river with another sea, further east, marked *Mare Caspium*, and full of islands, which is in a startling degree suggestive of the Aral. Further still to the east, towards *Sera*, appears a third and smaller sea, without a name, into which the *Gyon* flows (*i. e.* Jihun or Oxus). I dare not, however, lay much stress on this map, which contains almost nothing else to corroborate a claim to exacter information. The multiplied seas *may* have sprung only out of some misunderstanding of the classical geographers."²

¹ "Cathay," p. 232."

² "The map is engraved in 'Bongarsius, Gesta Dei per Francos,' vol. ii. There is a quasi facsimile of it in the second volume of Vincent; but in this latter the third sea is scarcely to be recognised."

augmented the volume of the Oxus, thus enabling it to supply a branch to the Caspian by the Gulf of Karabogas, and that to the failure of this supply we may attribute the drying up of the branch, without involving any great physical change of outline of the land. In this case the Aral Sea, occupying a separate cavity not communicating with the larger depression, would, as he thinks, become shallower, and to a great extent obscured by reeds, so as to have remained unknown to travellers for 500 years before and 500 years after Christ. M. Semenov suggests that in those days when the South-western branch of the Oxus existed, travellers proceeding northwards and meeting with little but reeds and marshes, might very well suppose that the Aral was merely an extension of the great Bay of Karabogas of the Caspian Sea. In illustration of this view he informs me that the inhabitants around the lakes Ala Kul and Sassyk-Kul have at this day no precise conception of their separation, and term them both Ala Kul simply, because they are unacquainted with the marshy and inaccessible isthmus between them. In Central Asia, too, the River Tchu, through its desiccation, has lost its former communication with the Lake Issyk-Kul, just as in the Aralo-Caspian region the Sary-su River has failed to reach the Syr Daria; and this last river, having lost its northern affluents, could no longer contribute (if ever it did) by any of its branches to the Oxus, and has found an easier embouchure in the Aral. How easily these changes of direction are effected in the course of rivers in flat and sandy countries, is well known to many Russian geographers who have explored Central Asia.

Thus, the Oxus, deprived of many of its former affluents, ceased to be able to throw any portion of its waters into the Caspian, and took the straight course into the Aral. This natural operation, as Semenov observes, may have also been accomplished within the historical period, and so, since its South-western or Caspian branch dried up, the Oxus, by throwing all, instead of a part, of its waters into the Aral, has given to that sea a better marked place in human knowledge than it had in the fourteenth and fifteenth centuries.

Before I quit the subject of the now desiccated former branch of the Oxus, I may state, on the authority of my correspondent, General Helmersen, that recently a memoir was presented to the Imperial Geographical Society of St. Petersburg, suggesting that men of science should be sent to the spot to examine into the evidences of that ancient bed of the river, and also to test, by soundings along the shore of the Caspian, if any remains of the

old delta of that stream could be detected. But the project, as well as the continuation of the survey and soundings of the southern edges of the Caspian, have both been suspended, I believe from motives of economy. The latter important work was under the able direction of Captains Ivachnizow and Oulsky, who had already proceeded so far that in less than three years they would have completed the survey of the whole of that vast interior sea; and it is indeed much to be regretted that a work of such great geographical interest should have been thus set aside.

In conclusion, my belief is:—1. That the Caspian and Aral have existed as separate seas before and during all the historic period. 2. That the main course of the Rivers Jaxartes and Oxus, as also of the sites of the Caspian and Aral seas, were determined in a prehistoric period. 3. That at one time the Oxus emptied itself both into the Caspian and the Aral, and that the Caspian branch-stream was sent back to the course of the other portion of the stream, either by the local rise of some lands between Khiva and the Caspian, or by desiccation and a want of sufficient power of water. And, lastly, that the Jaxartes never was deflected from its natural east to west course, to pass southwards, and so reach the Caspian by the southern end of the great elevation of the Ust-Urt, after a very long course at right angles to its present direction, to say nothing of its having in that case necessarily united with the Oxus by the way—a fact, of which, as already stated, all history is silent.

If old authors believed, without personal observation, that the Jaxartes, as well as the Oxus, fell independently into what they called the Caspian, we may easily account for such a notion, at a time when the true meridian of barbarous places lying to the north of any line of intercourse between Greece or Rome and Asia was wholly undetermined. May we not rationally infer that the ancient geographers believed that the Jaxartes, as well as the Oxus, flowed into the Caspian, simply, as suggested by Rennell, from having heard that the Jaxartes terminated in one great sea, and that they naturally believed that the Aral was then simply the north-eastern portion of those large inland waters of which they had heard, but of which they knew nothing accurately.

In truth, when we know that the geography of the Greeks, and even of the Romans, was worthless, in regard to any lands beyond the parallel of the mouth of the Oxus, we necessarily recur to the works of the earliest Arabian geographers, in which the Sea of Khwarezm was first exhibited as a separate sea. As such it also appears in

the maps of Rennell, of Williams, of Yule, and, in short, of all the best authorities, representing that which I believe to have been the true physical condition of the region during all historical time, and which I maintain dated from an ante-historical period.

In estimating the present or future relative importance of the Oxus and Jaxartes as lines of commercial traffic with China and India, I have no hesitation in saying that the latter river holds the first place. By reference to the memoir of Lieut. Wood, in the tenth volume of our 'Journal', describing the sources of the Oxus, and still better by inspecting the map of the Bolor Mountains and Upper Sources of the Oxus, which has just appeared in our present volume (vol. 36), I agree with the able Russian geographer Veniukof, who, after alluding to the wild barbarian races which occupy the high tableland of Pamir and the adjacent mountains, adds this significant passage: "When we, moreover, remember that this basin of the sources of the Oxus is closed in on the north, east, and south by mountains from 15,000 to 18,000 feet high, and across which the roads for pack-animals are few and difficult to traverse, we must arrive at the conclusion, that all idea of converting this region into a rich entrepôt for a trade with India and China must be abandoned."*

Before I quit the subject of the investigation of Central Asia, let me ask those of my countrymen who read German with facility, to peruse the great work of Ritter, the '*Erdkunde von Asien*:' and they will at once learn how to value the vast amount of modern discovery which is due to our Russian cotemporaries.

On former occasions I have naturally adverted to several of these remarkable researches; but I regret that, in my last two Addresses, I have omitted to notice, as I now do with special approbation, the memoir of M. Semenov, published in our Thirty-fifth Volume, on '*Djungaria and the Celestial Mountains*.' As the only man of modern times who has explored a considerable portion of the Thian-Shan or Celestial Range, M. Semenov must be placed among the most distinguished of the famous band of Russian explorers—not simply for having determined many geographical positions, the forms of the land and their altitudes, but also for his careful examination of the mineral character of the rocks which constitute the loftiest masses of those regions. In so doing, he has set aside one of the few errors which the illustrious Humboldt fell into in his grand generalizations, when he was led to believe that the Thian-Shan—

* 'Journal of the Royal Geographical Society,' vol. xxxvi. p. 263.

the great axial range of Central Asia—must be essentially one of volcanic eruption.

Influenced, doubtless, by his successful description of the Andes of South America, and the rise to their summits of active volcanoes, the great traveller was very naturally disposed to apply the same inference to the lofty chains of Central Asia; the more so as all the imperfect data he could collect seemed to indicate the existence of rocks of that class.

But as soon as the Thian-Shan was examined by the only man of science in our age who has visited it, he found nothing but sedimentary strata; and as this important rectification is due to M. Semenov alone, we must not only accord to him all due praise as a Geographer, but it is specially my duty as a Geologist to thank him for making this great observation.

In fact, the grand movements of upheaval, which determined the form of many of the loftiest mountains, whether in Central Asia or in the great northern barrier of India, the Himalayas, were caused by former expansions from the interior, doubtless due to central heat, which raised up sea-bottoms, often altering them into crystallised rocks, and elevating them to enormous altitudes, without exhibiting any true igneous rocks.

Having already twice alluded to the recent discoveries in Asia by the Russians, and we having endeavoured to do honour to them by the award of our Founder's Medal to one of the most distinguished Russian explorers, it is now my pleasing duty to advert to others of their recent labours in that quarter of the globe.

On former occasions I have dwelt upon the explorations of Eastern Siberia and the affluents of the grand River Amur and the mountains to the north. Let us now turn to Central Asia proper, and see what good documents have been furnished by the different men of science who have explored those regions. I gather from the bulletins of the Imperial Geographical Society that the communications of MM. Semenov, Severtzof, Poltarazky, Abramof, Bakkof, Goloubef, and Printz, explain the physical conformation of tracts and the natural riches of regions never before reached in modern times.

Of most of these hitherto unknown and wild tracts the Russian explorers have prepared or are preparing maps. To facilitate journeys from Siberia to Peking, Dr. Brettschneider, the physician to the Russian mission in China, has laid down upon a map all the different known roads across Mongolia, of which that which

is called the post road is 1760 versts long, between Kiachta and Pekin, with 68 relays. If the telegraph, which one of our countrymen, Mr. Gordon, who had travelled across this desert, sought to realize, be established, the journey across the desert of Gobi will soon be thought nothing of.

As to Bokhara, of which Englishmen have only painful recollections, on account of the murder of our distinguished officers, Conolly and Stoddart, we now know that two Russians, MM. Gloukovsky and Tatarinof, who were for seven months captives there, have added much knowledge to that acquired by their accomplished countrymen Khanikoff and Lehmann in 1842.

Those of our associates who may now visit St. Petersburg may see pictorial views of Khodjend, Tashkend, and all the places taken from the Kokandians in the recent advance of the Russians along the Syr Daria, and now forming parts of the great new province of Turkestan. I learn also, in reference to this region, so recently opened out to the civilized world, that M. Struve, the son of the great Russian astronomer, has prepared a map of the whole province of Turkestan, on a scale of 40 versts to the inch.

Deeply interested as we must all be in this grand opening out to geographers of a vast unknown country, my first request to my eminent friend Admiral Count Lütke must be, that as President of the Imperial Geographical Society and also of the Imperial Academy, he will procure for our Society copies of the maps which, to their great credit, the Russian geographers have prepared.

Northern Frontiers of British India.—At our last anniversary it was my duty to dwell upon the great accession to geographical knowledge obtained by the survey of Captain Montgomerie in the mountainous region north of Cashmir and the Himalayas Proper. I have now to remind you of the highly interesting journey made by Mr. W. H. Johnson, from Leh, in Ladakh, to Ilchi, in Chinese Turkestan, a city which had not been reached in this century by any European since the days of Marco Polo and the Mediæval travellers, except by Adolf Schlagintweit, who was killed. This town lies further northward than any point reached by his brothers when they traversed the Kuen Lun.

The clear and eloquent manner in which this great feat on the part of an Indian engineer, brought up under Sir Andrew Waugh, was laid before the Society by Sir Henry Rawlinson, renders all comment on my part superfluous. For he not only delineated the

achievement of that traveller, but put you completely into possession of all the historical data relating to this vast and little-known region, the routes used in old times for traffic, and pointed out to you how it happened that Ilchi, once a great mart on the highway between Russia and China, had been left aside on account of the more favourable route by Yarkand. Although I have always discouraged discussions on the political interests of our own country in reference to those of other nations, I entirely agree with the observation which fell from Sir Henry Rawlinson, that both the Russians and ourselves might trade advantageously with that great intermediate region, and that at the chief cities of each, consuls of either nation might live together in perfect amity.

When that state of things shall have arrived, our geographers would no longer be wanderers, stealthily seeking to acquire knowledge, but would be associated with Russian topographers in defining the physical features of wide tracts, which, though useful to both countries for trade, are far too vast to be objects of settlement for either.

The mineral products of this region are, no doubt, as numerous and important as Sir Henry Rawlinson described them to be, particularly in gold and jade, and the opening up of a fresh trade might be highly beneficial to ourselves and to Russia, now that the Chinese domination has been entirely set aside.

Tibet.—The survey of Lake Pangkong in Tibet, by that intelligent and active explorer, Captain Godwin Austen, is another fact of marked interest in the delineation of tracts lying to the north of the frontiers of British India. Passing from Leh over the Chang La Pass, 17,470 feet above the sea, this traveller, like Dr. Thomson in other adjacent tracts, encountered the most enormous accumulation of débris which had been swept down from the Snowy Mountains, occasionally barring up the streams. He followed the great lake to within a short distance of Noh, a Tibetan town of the province of Rudok. Although the Lake Pangkong has now an altitude of 13,931 feet above the sea-level, Captain Austen showed, judging from traces of remains of shells at considerable altitudes, that its waters must once have stood at a much higher level. At that remote period the waters were fresh and the country covered with rich vegetation; but now the waters of the lake are much too salt to nourish any molluscous animals, and its banks are entirely destitute of vegetation.

Site for a New Indian Capital.—At one of our evening meetings in

January a valuable paper by the Honourable George Campbell, a Judge of the newly-instituted Supreme Court of Judicature for the Bengal Provinces, was read and discussed. The subject was an enquiry into the most suitable site for a new capital for our Indian empire, there being a pretty general agreement in the condemnation of the present metropolis. Had it been possible to foresee the present extent of our dominion, it is almost certain that Calcutta would not have been our choice. It is situated at a corner of our dominion, all the most valuable portions of it lying north, south, and west of it, sometimes at distances of 1000 or 1500 miles. It lies in the delta of a great river, almost on the Tropic. The result of this locality is that the climate is unsuited to the constitutions of the denizens of a cold and temperate region, one-third part of the year only being congenial, while the remainder is divided between great heat and drought and great heat and moisture. In such a climate Europeans cannot labour out-of-doors without imminent peril to health, and the consequence is that most Englishmen, from the Governor-General downwards, abandon Calcutta, if they can, for two-thirds of the year. Still, as the port of the mighty Ganges, Calcutta is truly a metropolis. Although at first a village, it was the seat of our commercial factory; and Bengal, to which it belongs, was our first profitable acquisition—that acquisition, indeed, which, in the sequel, enabled us to make and maintain future territories.

The desirable points to be held in view in the selection of a second capital for India are, that the locality should be central, that the climate should be so temperate that the ruling class should be able to labour effectively without detriment to health, and that the locality should be secure from the dangers of foreign and domestic aggression. There are, no doubt, other qualities which it would be convenient to combine with these, but which are probably nowhere attainable. It would, for example, be desirable that the capital should be situated in a fertile and productive territory, capable of sustaining a large population, but such a position could only be found in the low and hot valleys of the great rivers. It would perhaps be desirable that the seat of government should, at the same time, be a great commercial emporium; but this advantage cannot be combined with the more indispensable requisite of a temperate climate, since all the possible commercial emporia of India are tropical, and on the sea-level. It would be desirable that the Government of India should have the benefit of a public opinion at its

seat; but this does not seem to be indispensable, for with the rapid communication which exists in our times, and which has been extended even to India, the public opinion of great provincial towns may be as effective as that of any capital.

Even centrality of position has, by the discoveries of steam navigation, the railway, and the telegraph, become of far less importance than it once was. The same discoveries have contributed to diminish greatly the risks of domestic insurrection, and as to danger from a foreign enemy, our substantial protection is not local, but rests on England, and the pre-eminence of England's navy.

The author of the paper points out the neighbourhood of a town called Nassick as the most suitable site for a new capital of India. Nassick is an inconsiderable Mahratta town, and a famous place of Hindoo pilgrimage. It has a fertile territory, is but 120 miles from Bombay, and on the line of one of the great railways; but then it is two degrees within the Tropic, and but 2000 feet above the sea-level, so that its summer heat cannot but be very considerable. Nassick did not receive the general approval of the able and experienced Indian officers* who discussed the question at our meeting. Some of the speakers expressed a favourable opinion of the Neilgherry Hills, a mountain range which covers an area of 600 square miles, and already the seat of several *sanatoria*, and which contains several extensive plateaux, which rise from 5000 to 7000 feet above the sea-level, with a reduction of temperature corresponding to these altitudes, and not unlike the climate of an English summer, although lying between the 10th and 11th degrees of latitude.

Delta of the Indus.—In the course of the session, a paper of eminent ability on the Physical Geography of the Lower Indus, was read by Colonel Tremenheere. It gave rise to a spirited discussion on a disputed question of engineering; but as engineering is not a special branch of geography, we, according to our usual practice, offered no opinion of our own. Exclusive of all theory, however, the subject of Colonel Tremenheere's communication, which includes in a direct line to the sea, 330 miles of the lower course of the Indus, and, incidentally, the harbour of Kurrachee, the only navigable entrance to the Indus, is of unquestionable importance.

The Indus, with its harbour, Kurrachee, I may observe, is to Western India what the Ganges and Calcutta are to Eastern India.

* For the various opinions expressed by Sir Henry Rawlinson, Sir Charles Trevelyan, Sir Robert Montgomerie, Sir Erskine Perry, and others, see 'Proceedings' R.G.S., vol. xi. p. 74.

No doubt the Indus and its affluents, passing as they do through a comparatively sterile and under-peopled region, are of far less value to agriculture than the Ganges with its affluents, which water the most extensive, fertile, and populous parts of India; yet it has its special advantages. For vessels of burden its navigable course is more extensive; it is our natural frontier at the only quarter from which our Indian dominion can be assailed, while it is the great highway to the possible points of attack. The port of Kurrachee has even some advantages over that of Calcutta. The navigable difficulties incurred in reaching it from the open sea extend only about 10 miles, while in the case of Calcutta they extend over 150. Kurrachee has, besides, the advantage of being from 2000 to 3000 miles nearer to England—the true source of our Indian wealth and power—than Calcutta. Kurrachee was, like Calcutta, a small village when we took possession of it only 24 years ago. It is now a considerable, well-built town, and its importance as a commercial emporium may be judged by the following simple fact. Its joint export and import trade in 1844 was of the value of 122,160*l.*, and on the average of the four years ending with 1866, it amounted to 5,500,000*l.*

Independent of the political and commercial advantages of the Indus, with its harbour, it is not to be forgotten that Kurrachee is the only port existing on the western side of India, with the exception of the fine one of Bombay. India, meaning by this the proper country of the Hindus, is, for a great, populous, and wealthy region, singularly deficient in good harbours. On its eastern side it has not one until we arrive at the head of the Bay of Bengal, where we find Calcutta, made tolerably safe, only by dint of great skill and heavy cost. It is worth notice, in a geographical sense, that the opposite coast of the same gulf forms, in this respect, a singular contrast, for here we have no fewer than four good and safe harbours, Negrais, Rangoon, Martaban, and Mergui, the three first being also the embouchures of navigable rivers. If we include Penang, which is on the same coast, we have five harbours, while large and populous Hindustan has but three.

Kurdistan.—In the mountainous region immediately to the north of the plains of Mesopotamia, and around the sources of the Tigris and Euphrates, our Consul at Diarbekr, Mr. I. E. Taylor, has been doing good work of late years in advancing geographical and archæological knowledge. In a former session of our Society, Mr. Taylor communicated to us the results of his researches during the

years 1861-3, when he explored the eastern head of the Tigris, verifying the description of Strabo, and discovering near it a record of an invasion of the country by one of the Assyrian monarchs. Returning, in 1865, to the scene of his labours, after a short visit to England, this persevering explorer has continued his researches in the direction of the Kara Su River, or Lycus of the ancients. He has lately sent us a brief preliminary account of this last journey, stating that he has traced this river to its sources and discovered the site of Pompey's Nicopolis. A more detailed account of these explorations, together with a map of his routes over districts never before visited by a European in modern times, is promised by Mr. Taylor, and will doubtless form the subject of discussion at one of our evening meetings early in the next session.

EGYPT.—*The Great Pyramid*.—Among recent publications, I must not omit to notice Professor Piazzzi Smyth's 'Life and Work at the Great Pyramid.' If our Government of late years has seemed too often chargeable with indifference to the promotion of scientific research in foreign regions, and even in its own dominions, there are still private Englishmen ready to devote their time and means to such researches. And as it is to the labours and munificence of one Englishman (Colonel Howard Vyse) that Europe owes all the most important discoveries regarding the general structure of the Great Pyramid, so now to the indefatigable work of another we owe the most minute and scientifically-accurate measurement of its details that has ever been executed.

Before his visit to Egypt, Professor Smyth had become an enthusiastic advocate of the late John Taylor's theory of the Pyramid as a great metrologic record; and it was his desire to test and develop this theory by more accurate measurements that carried him to Egypt. His stay there has enabled him to produce a book of great interest, both in the narrative of his operations and in their results; and its connexion throughout with metrology, in the most comprehensive sense of the word, renders it a fit work for the consideration of the Geographical Society. Some of the measurements were performed under remarkable advantages, for Professor Smyth had the good fortune to see the whole four of the corner-sockets of the Great Pyramid, as originally excavated in the living rock, uncovered simultaneously for the first time on record. Yet the important measurement between those fiducial points was sorely obstructed by the masses of rubbish that

surround the pyramid, the removal of which is too costly for private means. Professor Smyth shows clearly that the Great Pyramid is not merely the greatest of a class, but stands *alone* in its proportions and constructive arrangements. He shows that though its entrance passages were so carefully sealed, the details of their elaborate structure clearly point to the anticipation of future disclosure, whilst marks indicating the way to such disclosure have even been discovered by Professor Smyth in the masonry of the first descending passage. He has gone far towards establishing beyond doubt the fact—which many still reject—that the pyramid was originally cased with smooth Mokattam limestone (not granite, as some have stated). His measurements demonstrate that the pyramid is (or rather has been) a true symmetrical figure on a square base, the orientation of the sides of which deviates from the truth not more than 5 minutes at most, whilst their *mutual* deviation does not exceed 35 seconds. They prove that the altitude of the pyramid is to the perimeter of its base in the ratio of the radius to the circumference of a circle; that the number of cubits in the length of the base symbolises to a fraction the length of the solar year; that the cubical capacity of the lower course of the King's chamber is just 50 times the interior content of the granite coffer which stands within it; whilst the exterior capacity of the coffer is just double its interior contents. These are only a very few samples of the results of the measurements in which Professor Smyth conceives that he finds the records of a metrologic system of the most scientific kind; of a standard of length based on the length of the earth's semi-axis of rotation; of standards of weight and capacity based on the earth's mean density and on the preceding standard of length; of time standards in the length of the year and the record of the Sabbath week; nay of a standard of thermometrical and a scale of angular measurement. Some of Professor Smyth's concluding speculations and deductions are, doubtless, a little eccentric, and the least questionable of his results are astounding. But whatever may be thought of the more startling parts of the book, as a whole it is the record of a great undertaking scientifically executed, and it will doubtless produce much discussion among antiquaries and astronomers as well as geographers.

SOUTH AMERICA.—In my Address for last year I fully discussed, with the valuable aid of Sir Woodbine Parish, the geographical

questions which were solved by the exploration of the river Purús by Mr. Chandless. That most accurate observer ascertained beyond a doubt that the main branch of the great stream, which he ascended nearly to its source, did not extend to the mountain ranges of Peru. We have since received a full account of the second voyage of Mr. Chandless up the Purús, and of his exploration of its principal affluent the Aquiry, which he undertook in the season of 1865-6. He found no difficulty in navigating the Aquiry for the first 300 miles, even at the lowest stage of water, and considered it to be perfectly navigable for steamers up to the parallel of 11° s. Higher up it became wider and shallower, and his canoe was finally stopped by a network of stranded timber. After navigation became impossible, Mr. Chandless attempted to reach some river belonging to the Madre de Dios system, flowing from the Andes. He forced his way for a considerable distance through almost impenetrable forest, but, at the end of a week, was obliged to return for want of provisions.

While Mr. Chandless was thus, by an exhaustive process solving, in the negative, the question whether the streams flowing from the Cordilleras of Cuzco and Caravaya formed the river Purús, our Peruvian Honorary Corresponding Member, Don Antonio Raimondy, was furnishing us with information as to their true course. It appears, from our correspondent's narrative, that the enterprising Peruvian explorer Don Faustino Maldonado constructed a canoe in February, 1861, and embarked on the Madre de Dios with seven companions. He was drowned in passing a rapid, but his surviving comrades continued the voyage, entered the great river Madeira, and eventually reached Manaus on the Amazon, at the mouth of the Rio Negro. As the Beni is the only large river which flows into the Madeira on its left bank, it would appear that the rivers Madre de Dios and Ynambari, flowing from the Cordilleras of Cuzco and Caravaya, and which were so long supposed to be the sources of the Purús, are in reality tributaries of the Beni. Señor Raimondy's own valuable labours have comprised a careful examination of two tributaries of the Ynambari, in the province of Caravaya; but it is his intention to [continue the exploration of this interesting and very important region in future years.

It is with great satisfaction that I have to announce the departure, by the last Brazilian Mail Steamer, of that most indefatigable and accurate scientific explorer, Mr. Chandless, to the scene of his former labours and triumphs. It is his intention, on this occasion, to

ascend the rivers Madeira and Beni, and thus at length to reach those streams flowing down the forest-clad slopes of the glorious Eastern Andes, which he had previously sought in vain at the head-waters of the Purûs and Aquiry. We shall look with much interest to the results of our Medallist's further explorations.

While on the subject of South America, I may mention that the attention of the present energetic and enlightened ruler of Peru, Colonel Don Mariano Ignacio Prado, has been turned to the opening up of the great fluvial highways between the Peruvian provinces in the Andes and the main stream of the Amazons, chiefly by way of the Pachitea, a river which our Lieutenant (now Admiral) Smyth endeavoured to reach in his courageous exploration of the year 1834. Three steamers were employed last year in exploring the Ucayali and Pachitea, and succeeded in reaching Mayro, 325 miles from Lima, on the 1st January, 1867; thus proving the Amazons to be navigable for 3623 miles, from its mouth to the eastern slopes of the Andes near Lima. The hitherto almost unknown River Javari has also been lately explored, to the extent of about 1000 miles, by a joint Peruvian and Brazilian boundary commission. This laudable activity, while developing the resources of these countries, cannot fail to extend geographical knowledge.

AUSTRALASIA.—In my last Address I recorded the progress of the Expedition in search of Leichhardt, which had been organised by a Committee of Ladies at Melbourne, incited by our learned and enthusiastic associate, Dr. F. Mueller, and which had been munificently supported by grants from the Colonial Legislatures, besides donations from the Queen and our own Society. Since then the able leader of the expedition, Mr. Duncan McIntyre, much to the grief of the promoters, has fallen a victim to a malignant fever now prevalent along the banks of the streams which flow into the Gulf of Carpentaria.* Before this unfortunate event occurred, Mr. McIntyre had made good progress in searching for traces of the long-lost party, along the banks of the Albert, Gilliot, and Leichhardt rivers; questioning the natives and examining all the reports of white people living amongst the tribes. His journey across the continent, however, from the

* I am informed by Sir George Bowen, Governor of Queensland, in a letter dated 16th December, 1866, that the last accounts report an improvement of the public health in these districts.

River Darling to Burketown, on the Albert, has added but little to our geographical knowledge, the party having followed very nearly on the tracks of the former explorers, McKinlay and Landsborough. The death of Mr. McIntyre occurred on the 4th of June last; and I have lately learnt that Mr. W. F. Sloman, who succeeded to the command, has since also died. In this state of affairs, with the Expedition left to itself on the opposite side of the continent, the Ladies' Committee have entrusted its further management to Mr. Campbell, the uncle of the late leader, who has contracted to continue the search for the remainder of the two years originally contemplated, and has appointed Mr. W. F. Barnett as leader. By the last accounts from the Gulf of Carpentaria, dated December 21st, the party had resumed the search, and had obtained a valuable coadjutor in Dr. White; the camels were reported as in fine condition, and well suited for Australian travel.

In other parts of Australia the acquisitions to our geographical knowledge have been limited to local explorations in search of lands suitable for pasture or settlement. This has been especially the case with the colony of Western Australia, which has of late years added much to our information respecting the northern portions of its territory. Mr. R. J. Sholl has explored the neighbourhood of the Glenelg River and Camden Harbour, but without hopeful results as regards its capabilities for immediate settlement; and on his report the Provincial Government has abandoned the attempt to colonise the district. The settlement of the northern territory of South Australia has also proved a failure, and is now abandoned,—the survey of the neighbouring coasts and rivers undertaken by the Colony, with a view to discover suitable lands for colonisation, having borne no fruit. On the other hand, the progress of settlement in the tropical portions of Queensland, on the eastern coast, and at the head of the Gulf of Carpentaria, steadily continues. Another new township, named Carnarvon, has been formed in the Gulf, on Sweers' Island, to the north of the mouth of Albert River, where the harbour, named by Captain Flinders "Investigator Roads," is the only good one at the head of the Gulf. This is probably destined to become the principal seaport in this part of Australia, and the emporium for the settlements on the banks of rivers running into the Gulf. Upon the general subject of the advance of colonization in Queensland I entered into some detail in my last Address, and need not now recur to it, beyond calling your

attention to the able descriptive paper of Mr John Jardine,* which gives so much information regarding the neighbourhood of our new settlement of Somerset, at Cape York.

New Zealand.—Since the publication of the valuable papers of Dr. Haast and Dr. Hector, on the glaciers and passes of the Canterbury and Otago Provinces, in the Middle Island, New Zealand, in the 34th volume of our Journal, the exploration of the rugged and almost impassable mountain-range which forms the backbone of the island, has been continued by the former of these gentlemen. Owing to the discovery of gold on the western coast at Hokitika, the Provincial Government of Canterbury were anxious to discover some nearer route over the mountains than the circuitous one by the Hurunui and Teramakau or Harper's Pass; and several parties were sent out to find, if possible, other passes. From this resulted the discovery of Arthur's Pass (3038 feet) near the head-water of the Waimakariri, by Messrs. Arthur and George Dobson, and the north Rakaia Pass (4645 feet) by Messrs. Browning and Griffiths, which latter reduced the distance between the east and west coasts by about eleven miles. On Dr. Haast devolved the duty of examining these different passes, and preparing a series of altitude sections by barometrical observations, to serve as a guide to the Government in choosing the best route. The task was accomplished in the latter part of the year 1865; Dr. Haast traversing the various passes, and, on his return to Christchurch, drawing up a series of admirable diagrams in illustration of the subject, copies of which, together with a descriptive paper, he has forwarded to me for presentation to our Society. The north Rakaia Pass was found by Dr. Haast to be deeply covered with snow in the early summer, and he states that the routes by Arthur and Harper passes (although considerably longer) will always be preferred by travellers, as they are seldom obstructed by snow, and are not subject to avalanches.

CONCLUSION.—In concluding this, the thirteenth, Address which I have delivered to you, I must now assure you that the Council ought to have selected some one younger than myself to occupy your chair. For in truth, my numerous avocations press so heavily upon me, that, with the heartiest desire to serve you, I am too well aware of my inability to efficiently perform all I could wish.

* See 'Journal R.G.S.,' vol. xxxvi. p. 76.

Permit me, however, to explain, that if this Address is not as complete as it ought to be, my chief apology is that, as our anniversary approached, I was in the throes of bringing out a new edition of the chief work of my life, 'Siluria.' But whilst Geology has been the pursuit on which I have established whatever little reputation I possess as a labourer in the fields of Science, I know that you will believe me when I say that I have so loved Geography that I have through life considered these two great branches of knowledge to be inseparably connected. At all events, during my term of office as your President, I have ever striven to the utmost of my power to preserve the efficiency and augment the influence of the Royal Geographical Society.

If, then, you should be pleased to adopt the recommendation of the Council, and re-elect me, I promise you that, if I be spared, I will put forth what energy remains in me to carry out your wishes during the ensuing year. But really, when that term shall have expired, I trust you will place at your head a younger chief; and whoever he may be, I am sure when he has been but a year in office he will declare, as I have ever done, that the Fellows of this Society are men of whose support he may well be proud, and over whom it is a true honour to preside.



PROCEEDINGS

OF

THE ROYAL GEOGRAPHICAL SOCIETY.

[ISSUED NOVEMBER 4TH, 1867.]

SESSION 1866-67.

Thirteenth Meeting, 3rd June, 1867.

SIR RODERICK I. MURCHISON, BART., K.C.B., PRESIDENT, in
the Chair.

PRESENTATIONS.—*Dr. J. R. Aldom; W. G. McIvor, Esq.*

ELECTIONS.—*H. A. Glass, Esq.; E. T. Higgins, Esq.; John Johnstone, Esq.; Robert Eadie, Esq.; Alfred Seymour, Esq., M.P.; John E. Watkins, Esq.* (Her Majesty's Consul, Chicago).

ACCESSIONS TO THE LIBRARY FROM MAY 13TH TO JUNE 3RD.—
'Central Afrikanische Vokabularien,' von Heinrich Barth, 3 parts.
'Geographisches Jahrbuch,' 1 band. Donor, M. Justus Perthes,
Gotha. Five Papers on Ethnology, by John Crawford, Esq.
Donor, the Author. 'Water Supply of Jerusalem, Ancient and
Modern.' 'Proposed Water Supply and Sewage for Jerusalem.'
(Jerusalem Water Relief Society), by John Irwine Whitty, Esq.,
LL.D., D.C.L., C.E. Donor, the Author. 'Dell' Eclisse Solare del 6
Marzo, 1867,' by Dr. Cacciatore. Donors, the Palermo Observatory.
'Sullo stato presente dei lavori pel taglio dell' istmo di Suez,' di
Monsignor F. Nardi. Donor, the Author. 'Report on the Irriga-
tion of Eastern Spain,' by Clements R. Markham, Esq., F.S.A. Donor,
the Author. 'Relation Originale du Voyage de Jacques Cartier
au Canada, 1534.' Paris, 1867. Purchased. 'The Darien Indians
and the Ship Canal:' a Paper by Dr. Cullen, 1867. Donor,
General Balfour. 'Viaggio da Gerusalemme,' per Le Coste Della
Soria, 2 vols. 'Villagiature de' Bizantini sul Bosforo Tragico,' by
Luca Ingigi, 1 vol. Donor, Sir Charles Trevelyan. 'The Gulf
Country:' a collection of papers containing the correspondence
of W. Landsborough, Esq., with his Excellency the Governor of

Queensland. Albert River, July, 1866, to September, 1866. 'South Australia:' a collection of papers, containing a Report of J. McKinlay's Northern-Territory Explorations; also a portion of his Journal, and proceedings of the surveying schooner *Beatrice*. 'Report of the Central Argentine Railway, 1867.' From the Secretary. Engravings of Christopher Columbus, one by Fry and one by Schriren. A valuable collection of photograph Portraits of the Fellows of the Royal Geographical Society, by Maul and Company.

ACCESSIONS TO THE MAP-ROOM SINCE THE LAST MEETING.—Stieler's Hand-Atlas, in 14 parts, by H. Berghaus and A. Petermann. Missionary Atlas, by Dr. R. Grundemann. Stieler's Karte v. Deutschland, 3 sheets. Map of Hungary—Magyar Korona, by Berghaus-Gönczy. Map of the Holy Land, by Van de Velde. New Map of the Kingdom of Italy, by L. Schiaparelli and C. E. Mayr. Spruner-Menke, Atlas Antiquus, on 31 sheets. Chart of the World, by H. Berghaus and Stülpnagel. All the foregoing presented by Justus Perthes of Gotha. Map of the States and Territories from the Mississippi River to the Pacific Ocean, by G. and C. Colton. Map of California and Nevada, by L. Ransom, &c. Plan of Sweer's Island and Township, Gulf of Carpentaria, Australia. Landsborough's Route, from Bowen Downs to Neelia Creek, Queensland, Australia. Presented by Sir George Bowen.

The following Papers were read :—

1. *On Dr. Livingstone's Last Journey and the probable ultimate Sources of the Nile.* By ALEX. GEO. FINDLAY, F.R.G.S.

THE author stated that the object of his Paper was to demonstrate, as far as it was possible to do so inferentially, that Dr. Livingstone had reached, or was about to enter, the southern limits of the basin of the Nile, when the last painful news of him was forwarded from Africa. This conclusion was the result of a long-standing conviction that Lake Tanganyika would some day prove to be the southern reservoir of the Nile. The author had arrived at this when he was very much engaged with Captains Burton and Speke, in 1859, in discussing and calculating the very copious and most excellent data brought home by their nobly completed expedition of 1856-9.

The points which he wished to insist on were these :—

1. That Dr. Livingstone has determined that the Tanganyika Lake has no connexion with the Nyassa Lake :
2. That all known testimony makes the river at the South end of the Tanganyika Lake run *into* it :

3. That this Lake *must* have an outlet, and that this is probably to the North :

4. That the observations of Sir Samuel Baker, as compared with those of Captain Speke, make the Albert Nyanza on the same level with the Tanganyika Lake, and, further, that the two lakes probably join each other :

5. That therefore the streams which flow north-westward from the mountains at the head of the Nyassa Lake contain the true sources of the Nile.

Lake Nyassa was first seen by Dr. Livingstone Sept. 16, 1859. He had followed up the important River Shiré to its outlet from the lake. It was afterwards visited by the unfortunate Dr. Roscher, who reached it from Kilwa on November 19, two months after Dr. Livingstone had visited it. The lake is very deep, possibly much exceeding 116 fathoms, and has the deep blue or indigo tint of the Indian Ocean—a sufficient proof of its great depth. The eastern shore has not been examined; but it is known to be limited on that side by lofty mountains. On the west the beautiful tree-covered heights, probably 4000 to 5000 feet high, are the edges of table-lands, through which flow five rivers, the only affluents on this side. These, with what others enter it from the east and north, will be sufficient to account for the annual rise of the lake (about 3 feet) in January, and for the flow of the Shiré.

The northern end of the lake is of the greatest interest in relation to the question now under consideration. It was visited, as is well known, by Dr. Livingstone's expedition, a second time, in October, 1861. The published narrative, and still more the conversations of Dr. Livingstone and Dr. Kirk, lead to the conclusion that no river of considerable magnitude enters the north end of the Nyassa Lake. From the height of at least 1000 feet, over which the land party toiled, the dark mountain masses on both sides of the lake were seen closing in. At this elevation the view extended at least as far as that from the boats; and it was believed the end of the lake lies on the southern borders of 10°, or the northern limits of 11° s. lat.

The settlement of this point in the physical geography of East Africa carries with it the conclusion as to the water-parting of the whole of the river-systems between the Zambesi and the Nile. For, should any river fall into the north end of Lake Nyassa, it must be a very large one, draining, as it must do, an area of at least 300,000 square British miles, or a country as large as England and France combined.

Dr. Livingstone's first journeys to the Nyassa Lake, therefore,

did all but conclusively determine that Lake Tanganyika has no outlet to the southward.

It has been frequently argued, and especially by Captain Speke, that the Tanganyika Lake drained into the Nyassa. Their relative levels, as far as is known, would admit of such a theory. Dr. Kirk's careful and satisfactory observations, in August to October, 1860, makes Lake Nyassa to be 1522 feet above the sea, a much lower elevation than that previously assigned to it, and *at least* 300 feet, and possibly 1300 feet, below Tanganyika Lake.

Now, as Dr. Livingstone's last journey had for one of its primary objects the determination of this important point, it may be inferred, to a certainty, that his last journey confirmed his previous convictions. We know that he had crossed a marsh, which was found to stretch farther north than he had previously seen, and then continued his journey *westward*. If this marsh had been traversed by the course of a large river, such as the requirements of the case lead to the certain inference, he would have followed up this important feeder to the *northward*, and traced its connexion, if any, with the northern lake, or till its character was really determined.

The author, therefore, held it to be a point now settled beyond controversy, that Dr. Livingstone has determined that Lake Nyassa and Lake Tanganyika have no connexion with each other; and by that decision he has also determined, in a great measure, where we are to look for the true sources of the still mysterious Nile.

The second point was the direction of the streams running south of the Tanganyika Lake.

The distance from the north end of Lake Nyassa to the reported southern part of Lake Tanganyika is about 340 or 350 miles, and the direction is N. 55° W. Of the country immediately intervening we know nothing but from very imperfect native report. About the mountainous country further west we have more information, several important routes having traversed it.

First from Dr. Livingstone. After having explored the western shore of Lake Nyassa, he started from about its centre in September, 1863, for the west, a period of the year too late to accomplish any great exploration. But he succeeded in determining one very important point—the position of the water-parting of the rivers flowing into Nyassa and those flowing westward.

Beyond the point attained by Dr. Livingstone no recent traveller has penetrated, but further to the westward several expeditions have passed from the Portuguese settlements on the Zambesi to within a very few miles of the probable southern end of the Tanganyika Lake. The chief of these are cited, not as novelties, for

they have been often quoted, but because the present moment invests them with a stronger interest.

A Portuguese colonist from Goa, Gonçalo Caetano Pereira, had sent from Tete more than one trading mission to the Cazembe prior to 1786, and in that year sent his son Manoel Pereira in charge of a mission to the same potentate. The accounts given by these enterprising men, as related by Dr. de Lacerda in his preliminary notes to the account of his expedition, contain many geographical features of importance to our present subject.

Manoel Caetano Pereira, the son, started in May, 1786, with his own slaves, and the Muizas who had brought down the Cazembe's ivory the year before, and after traversing the land of the Maravi—a term by which the great lake (Nyassa) was then known to geographers—was forty-five days in reaching the Aroangua River, the stream whose head-waters were found by Dr. Livingstone in September, 1863, and then called the Loangwa or Zumbo—the latter name from the place where it falls into the Zambesi, 220 miles above Tete. In twenty days more he struck another river, called Zambeze, of which Dr. Lacerda says, "From the information of the people I venture to say that it is not our Zambeze or any of its influents from the Xire (Shiré) river upwards. The Zambeze of the Muizas flows to the *right* hand of those crossing it from Tete, and falls into other streams;" but he makes some confusion afterwards in the lakes into which it runs. "Manoel's party travelled thirty days from the river to the King's capital, crossed some deserts, and spent a day fording a lake waist-deep. This body of water is drained by *two* channels, one to the Zambeze, the other to the Murusura River, which passes the royal residence." What follows is almost unintelligible, at least with our present knowledge, but it is directly confirmatory of what Dr. Livingstone has heard so recently.

In the further expedition to the father of the Cazembe chief, Muata-Ya-Nvo, to the north-west, the route appears to cross some of the affluents of the Luapula River, which it could be demonstrated, as far as our imperfect knowledge goes, flows to the north-east and east.

The important mission of Dr. de Lacerda left Tete for the country of the Cazembe on July 3, 1798. The objects of this costly and noble undertaking were, as he tells us, to ascertain if Central Africa contains any mountain capable of sending forth the Cuñene River, which falls into the Atlantic a little below Cabo Negro, and to find a short and easy communication overland from Portugal to the Rios de Sena, and especially to seek the means of bringing these infidels

into the bosom of the Church. In the instructions which he issued to his officers, to be followed in case of his own death, he makes especial mention of the "Zambese," reported by the Pereiras, and directs that if it should flow to the right (that is, *eastward*) they would do well to descend it to ascertain whether it falls into the Shiré, but if to the left or westward, it may be the Cuñene, a river which Dr. de Lacerda had endeavoured, unsuccessfully, to explore in 1798; and then it is to be followed down to its mouth, and thence find their way to Benguella. The same method of proceeding is laid down with respect to the river flowing past the Cazembe's capital.

The expedition started, as before stated, on July 3, 1798, and reached the northern Aroangua River at the end of August; on the 30th they reached the Serra Muchingua, which he named Antonina, in honour of the Prince, fixing astronomically a point about 70 miles south-eastward of it, Mazavamba, in latitude $12^{\circ} 33'$, longitude $32^{\circ} 18' 15''$. This very important position gives us a perfect clue to the course taken by the expedition, and the approximate position of the important Muchingua or Maxinga Range, probably a continuation of that seen by Dr. Livingstone north-west from Lake Nyassa, and which also may be the dividing range of the waters which flow toward the Zambesi on the south and those which pass through the Cazembe's country to the northward. Dr. de Lacerda afterwards speaks of the desolate and rugged country they traversed, and the cold they suffered from, which indicates a lofty region.

On September 10 they reached the northern Zambeze River, and here they made some geographical difficulty. Dr. de Lacerda says:—

"My principal desire being to obtain exact geographical notes of the size and the direction of all streams crossed between Tete and the Cazembe's country, and from the latter to Angola, I laboured to extract information from different Muize Caffres, and from Manoel Caetano Pereira, making repeated and compared inquiries to avoid errors arising from strange languages. All uniformly and repeatedly assured me that the Zambeze (Chambeze) and the Rugurue River ran to the RIGHT of one travelling to the Cazembe. Pereira confirmed this information, from which I infer that he does not know his right from his left hand."

Again:

"To-day (Sept. 11, 1798) I sent to inquire about the course of the Zambeze of sundry Mussucumos, a tribe mixed with the Muizas, some vassals of Cazembe (these were my informants) and others independent: *all* said that it trends to the river which runs by the city of the Cazembe,—whatever be the worth of their information, which at present I neither allow nor disallow."

Now nothing can be more circumstantial or direct than this information, that the rivers (which Gamitto says first flow to the

west) ultimately join that running northward past the Cazembe's city—the Luapula or Guapula River.

When this is connected with what is related by Dr. Livingstone, of the streams flowing westward from what is probably the westernmost spur of the great Maxinga Mountains, and which is further confirmed by the undeviating testimony obtained further north, it seems that it would be a perfectly fair inference to state that Dr. Livingstone had seen and crossed the head-waters of one or other of the streams which flow toward the Cazembe country.

The position of the crossing of this northern Zambeze by Dr. de Lacerda is well ascertained, for on September 21st, 1798, eleven days afterwards, he observed an immersion of Jupiter's first satellite, which gave him the longitude of $30^{\circ} 1' 45''$ E.: this was in latitude $10^{\circ} 20' 35''$, and was his last astronomical observation. The place he calls Mouro Achinto, which Gamitto says was the name of the village chief. When Monteiro was here, October 15, 1831, it was called by the name Messire Chirumba.*

Dr. de Lacerda's further journey to the Cazembe's capital is a narrative of his personal sufferings. He passed near to a great lake on his left hand (westward), which has been called Chama; but this was the name of the district (it is also called the Shuia Lake), and reached Lucenda, October 3, 1798, worn out with fever and anxiety.

The next travellers in this region who give any clear account of the country are Major José Manoel Correa Monteiro, as related by his companion Major A. C. P. Gamitto, who went on a mission to the capital of the Cazembe—Lunda or Lucenda—in 1831-2.† They started June 1, 1831, and followed the same general line of march described by Dr. de Lacerda.‡ On September 19th they crossed the Serra Muxinga,§ called by Dr. de Lacerda "Muchingua," and named by him the "Cordelheira Antonina." No estimate is given of its height; but it must be exceedingly lofty, for on the second day of their ascent they marched a league, continually ascending to the ridge of the mountain, where the pass was obstructed by an immense rock, like a portal to the defile. The direct route lay through a natural aperture, $2\frac{1}{2}$ feet in diameter, in this rock, or else around it, over a terrible and dangerous precipice. This passed, they came upon a difficult and elevated desert country, where they suffered much from hunger.

On their return they reached the Serra Muxingua on August 10,

* 'O Muata Cazembe,' p. 196.

† 'O Muata Cazembe, e os povos, &c., da Africa Austral.; Diario da Expedição Portuguesa commandada pelo Major Monteiro, e redigido pelo Major A. C. P. Gamitto. Lisbon, 1854.'

‡ 'O Muata Cazembe,' p. xviii.

§ Ibid., pp. 170-172.

1832, and give a longer account of it. It stands as it were alone, rising at once abruptly and very steeply from the table-land, but traverses an immense extent of country. It was estimated to reach an elevation above the sea of a league (Portuguese), or about 19,700 feet. Its head was nearly always enveloped in clouds, but no sign of snow or ice was visible or reported. The height, probably, is exaggerated, but Gamitto says that it is by much the most lofty summit in this part of Africa, and has precipices of a prodigious height. It commands most extensive prospects to the northward.*

On October 9th they reached the River Chambezi, called by the natives Cono, a very rapid stream running to the west, but where afterwards no one knew; but Monteiro thought it might reach the Zambeze.† There is nothing, then, in their diary that militates against the results of the much more useful enquiries made by Dr. de Lacerda.

Without following our travellers further, or further alluding to the great lakes they passed, or that of Mofo near to the Cazembe capital, it may be accepted as a general conclusion, from their evidence, that the streams from the north-west of the Lake Nyassa, and northward of the mountainous desert which skirts the Serra Muxinga, run towards the lakes at the Lunda capital, and then, as far as report says, to the north-eastward.‡

To these testimonies we must add the more important one of Dr. Livingstone. As before quoted, he had taken great pains to ascertain from the travelled Babisa and Arabs as much as possible about the country in front.

“There could be no doubt that our informants had been in the country beyond the Cazembe’s. The Lualaba is said to flow into the Luapula; and when, for the sake of testing the accuracy of the traveller, it was asserted that all the water of the region round the town of the Cazembe flowed into the Luambadzi, or Luambezi (Zambesi), they remarked, with a smile, ‘He says the Loapula flows into the Zambesi—did you ever hear such nonsense?’ or words to that effect. Their geographical opinions are now only stated without any further comment than that the itinerary given by the Arabs and others shows that the Luapula is twice crossed on the way to the Cazembe’s; and we may add that we have never found any difficulty from the alleged incapacity of the negro to tell which way a river flows.”§

Although it is a great trading highway with the Arabs and natives, no European traveller has passed north-eastward of the Cazembe’s city.

To carry the argument that the waters flow north-eastward far-

* ‘O Muata Cazembe,’ p. 402.

† Ibid., p. 447.

‡ See ‘Proceedings Royal Geographical Society, 1864,’ vol. vi. p. 262. Dr. Kirk confirms this—that the Loapula flows north into a small lake.

§ ‘The Zambesi and its Tributaries,’ pp. 532, 533.

ther, we derive some information from another region, that of Lake Tanganyika.

All recorded testimony acquired from the natives prior to the first East Africa expedition, and information given to Captain Burton, and every pains taken both by that traveller and Captain Speke, while in the country, only lead to one conclusion—that at the south end of Tanganyika Lake a river, the Runangwa or Marungu, runs *into* it; and it is only of late that any theory has made it run out, and so join the Nyassa Lake. There is nothing more certain known now of any particular of the great Tanganyika Lake than was acquired in the first and only visit made to it, in February to May, 1858; and as the geographical relation of this great and important body of water to African hydrology rests upon a single and very questionable observation, a few brief though well-known particulars are here cited.

The first East Africa expedition, sent out by the Royal Geographical Society in October, 1856, was organised and arranged by Captain Burton. He was joined by Captain Speke at Cairo, Nov., 1856, and finally left Zanzibar for the interior, June, 1857. This fine undertaking was most inadequately subsidized. Only 1000*l.* was supplied by the Government, through the Society; 750*l.* at the outset, and 250*l.* on their return. The rest of the total cost, 2500*l.*, was defrayed jointly by the travellers themselves.

It succeeded beyond expectation; and Mr. Findlay thought he was warranted in stating that there never was an expedition based on such limited means, traversing an entirely unknown country, through miseries and difficulties only then first ascertained, which brought to the knowledge of civilised man such a harvest of information on almost every branch of interest. The topography of Captain Speke is wonderfully perfect, considering his health and means of observation; and the 29th volume of the Society's Journal contains a masterpiece of descriptive geography.

They reached Ujiji, on the shore of the Tanganyika Lake, then seen for the first time, on February 18th, 1858. A single observation of Captain Speke, with what he described to Mr. Findlay as a "bath" thermometer, gave as the elevation of the lake 1844 feet. But this thermometer read 214° instead of 212°, when brought down to the East coast again. Captain Speke's second expedition will perhaps indicate when the index error, which subsequently increased to this great extent, became sensible. There was only one lunar observation taken for the longitude of Ujiji, which point determines the position of the lake, and this was discarded, and the position laid down from dead reckoning; but I believe that it cannot be far wrong. How energetically the intrepid travellers essayed, without

success, to reach the north end of the lake, and thus solve the great secret, has been often told. They had, however, seen what appeared to be the end of the lake, in lat. $3^{\circ} 8' \text{ s.}$

The general character of Tanganyika Lake, as ascertained by observations and by hearsay, was as follows:—From Ujiji to the north end, as far as was seen, was about 100 geographic miles. Captain Burton estimated, from report, that it was 150 miles from Ujiji to the south end, making it 250 miles in length. Captain Speke's maps extend this considerably. His first map makes its south end 230 miles from Ujiji, terminating in lat. $8^{\circ} 30' \text{ s.}$ His second map abridges this to lat. $8^{\circ} 6'.$ His first published map reduces it to lat. $7^{\circ} 45',$ like Captain Burton's estimate. This would be within 80 or 100 miles of Lucenda, the Cazembe capital.

It is evidently very deep, but no soundings could be taken. No mention is made, or evidence seen, of any change of level.

That an inland sea, of such magnitude, receiving the drainage of such a great extent of country, in a climate where the evaporation bears a large proportion to the rainfall, it is quite incredible that its waters should be FRESH. In the countless ages since its formation, it must have become saline, like the Dead Sea, as an extreme case, or the Caspian as another, or the Shirwa Lake of Dr. Livingstone, the deep waters of which are brackish, and taste like a weak solution of Epsom salts.

If this be granted, there are only three solutions to the problem. First, that it has an outlet to the Indian Ocean south of the route of the two East Africa expeditions; or, secondly, that some river runs to the westward, forming an affluent of the Congo, or other large Atlantic river; or, thirdly, that it drains northwards, to which argument these remarks tend.

In the first place, its outlet cannot run towards the Indian Ocean, to the northward of the parallel of its southern end, for that region was perfectly explored by Burton, Speke, and Grant. The Lufigi River, which debouches in lat. $8^{\circ} 0' \text{ s.},$ has not been examined, but its known character will not admit of such a supposition. Its upper course, known as the Ruaha, traverses the upland desert only in the rainy season, and the space between its occasional sources and the south end of Tanganyika Lake is constantly traversed by the Arab caravans passing from Zanzibar towards Lucenda, for ivory, and Kitanda, or Kitata, south of the Cazembe's, for copper. These cross, or pass, a shallow morass or lake, the Rukwa lagoon, which, at times, joins the Tanganyika Lake. No river is crossed. The Ruaha, whose real sources are still unknown, is not passed. It cannot, then, run eastward.

The second alternative is, that it drains to the westward, or, in other words, that it either contains the source of the Congo, whose mouth is 1100 miles from the western shore of the lake, or that the waters flowing westward are finally absorbed by evaporation. To combat these views with the facts at command would lead far beyond the limits of this paper. Suffice it to say, that several routes to the westward of the Tanganyika not only negative this, but also would almost prove that the waters flow *into* the lake. The great distance will present now the most cogent argument against this; while we have the third, that the Rusizi River is an effluent.

The THIRD point is this northern outlet of the lake.

The additional knowledge we now have places this matter in a very different position from what it was in 1859, and the author averred that, if our late data be correct, there could be no other solution to the Nile question. He would name the difficulties as they have arisen.

After Burton and Speke had finished their exploration of Tanganyika, they returned, with means almost exhausted, to Kazeh; and here Captain Speke completed a rough outline of their route, and forwarded it to England, with a map, which shows that they conceived that the Tanganyika continued to a valley open to the N.N.W. Captain Speke, leaving Burton to prepare for their return march, then started for the northern, or Ukerewe, lake, July 9th, and on August 3rd observed it to be higher than Kazeh, or 3740 feet. This, also, was an imperfect result, from the defective thermometer. Returning to Kazeh, they collected the remnant of their property, and retraced their steps to the coast.

After having visited the Ukerewe, or Victoria Nyanza, Captain Speke was firmly convinced that this was the true and *only* head of the Nile. That it is one of these reservoirs, no one can doubt. But in order to account for the supposed southern flow of the Ruzizi River, he drew a range of lofty mountains around the head of the lake, and between it and his own Lake Victoria, at a distance of 150 to 170 miles to the northward. These were purely hypothetical, as they were never seen or heard of.

The second East Africa expedition, under Captains Speke and Grant, went over precisely the same ground that the first had done, except where crossing the lofty coast ranges. Arrived at the upper plateau, we find that the thermometric observations in the second expedition, as compared with the first, give a lower elevation of about 350 feet to the country up to within 40 miles of Kazeh, their crucial station; but here the second elevations exceed the first by about 100 feet. It is probable, therefore, that hereabout the instruments in the first expedition began to fail.

It has been objected that these absolute and independent observations by the thermometer involve a fallacy, as the difference of level thus shown must be dependent on the varying pressure of the atmosphere: but to this may be replied that this region is so near to the equator, that the diurnal or secular variations of the barometer are nearly at a minimum, and that the whole range, except during cyclones or hurricanes, does not exceed a very few tenths of an inch in the mercurial column (each tenth of an inch representing 85 feet of elevation); and that all the observations relating to this point were taken under the same circumstances. Most certainly absolute accuracy must not be demanded for them; at best they can be but approximations.

Captain Speke made the elevation of the north side of his Victoria Nyanza (in his second expedition) to be 432 feet lower than in the first; and between this point and Gondokoro he made FOUR other observations, to which Mr. Findlay wished to draw especial attention. The first is near Kamrasi's Palace (Luluga), 2856 feet; the second at the Karuma Falls, 2970 feet; the third, South Luluga, between Karuma Falls and Kamrasi's, 2906 feet; and Paira, 18 miles south of the junction of the Asua River, 1793 feet. (Sir Samuel Baker says that the Nile, issuing from the Albert Nyanza, is navigable as far as this, and therefore they are on the same level.) Finally, Gondokoro was made to be 1298 feet above the sea. Captain Speke's thermometers were not brought home, and therefore their index errors, which were probably considerable, could not now be ascertained. But they are all relative to each other, and one common correction would apply to all.

Captain Speke heard of the Great Lake, to the westward of Kamrasi's, since explored by Sir Samuel Baker, and named by him the Albert Nyanza. This lake was also reported to lie in almost the same position by Mr. Petherick, from information given to him by his man Mussaad, who went southward to within four days' march north-west of the north end of the lake. It was also announced by Dr. Peney, May 20th, 1861.

In addition to this lake, Captain Speke places another, the Rusizi Lake, at the distance of 110 miles due north of the north extremity of the Tanganyika Lake, and connects them by the Rusizi River, which passes through Uzige country. This Rusizi Lake therefore lies in the heart of the mountains he inferred to exist in 1858.

The names Ujiji, Rusizi, Uzige, N'zige, which are placed on this line by Captain Speke, have a great resemblance to each other.

Mr. Consul Petherick reached Gondokoro, Feb. 20th, 1863, and made the elevation by thermometer B. P. (three observations) 1265

feet, a remarkable coincidence with those of Captain Speke's—they are identical.*

Mr. Petherick gave a similar thermometer to Sir Samuel Baker, who had arrived at Gondokoro a few days previously; and this also has been returned and tested,† so that its error, and the application of the difference, is not only available for its own results, but will also test and correct those which can be directly connected with it.

Sir Samuel Baker and his lady ascended the rivers on the track which had been descended by Captains Speke and Grant; and, with this thermometer of Mr. Casella's, he observed the altitude at the four places mentioned above as having been observed by Captain Speke. For the sake of comparison they are placed (with Gondokoro) in juxtaposition below; those of Captains Speke and Grant being uncorrected, and those of Sir Samuel Baker with the final corrections determined on at Kew.

	SPEKE.		SIR S. BAKER.	Difference.
Luluga (Kamrasi's) ..	2856 ft.	Mrooli (do.) ..	4061 ft.	1205 ft.
Karuma Falls	2970	.. ..	3966	1026
S. Luluga	2906	.. ..	4056	1150
Paira	1793	(R. Nile, near) ..	2720	927
Gondokoro	1298	.. ..	1999	701

Mean of the five differences, 1002 ft.

We have thus a clear difference between Captain Speke and Sir Samuel Baker of 1000 feet, at nearly, or quite, the same places. This may seem to be a very large proportion of the entire elevations; but it should be remembered that even in the last one, Gondokoro, it has been thought necessary to add 700 feet to the result obtained by Mr. Petherick with the same instrument.

This difference of 1000 feet must therefore be either *subtracted* from Sir S. Baker's elevations or *added* to Captain Speke's; one or the other will prove the point Mr. Findlay wished here to insist on.

Not only would this correction regulate the observations made in Captain Speke's second expedition, but it would apply to those made in the first, as the second passed over the same ground.

It has been said above that the second expedition made Kazeh 92 feet, as a mean, higher than did the first. Therefore the observation at Tanganyika must also be brought in, as it was made by the same instrument, placing it at 1844 feet.

Now, as Captain Speke's measurements throughout are consistent with each other, if we accept them as correct, it is perfectly possible

* Mr. Petherick's observations are given in the 'Journal Royal Geographical Society,' 1865, vol. xxxv., p. 300.

† See 'Journal Royal Geographical Society,' 1866, vol. xxxvi., p. 16, where Sir S. Baker's observations are computed and investigated by Mr. Dunkin.

for Tanganyika Lake at 1844 feet to flow into Gondokoro at 1298 feet, past Paira at 1793 feet elevation.

But then, Sir Samuel Baker makes the Albert Nyanza to be elevated 2720 feet. If we take Captain Speke's observations as correct, this must be *reduced* to 1720 feet, identical with Captain Speke's observations at Paira, nearly or quite on the lake level; or, what is much more reasonable, we must apply the known correction by Sir S. Baker's thermometer to Captain Speke's observation, acknowledged to be imperfect; this will bring Tanganyika Lake up to 2844 feet, or **124 FEET ABOVE THE ALBERT NYANZA.**

Either of these views will quite determine the question as to the POSSIBILITY of Lake Tanganyika being connected with the Albert Nyanza.

Without claiming for these hypsometrical observations any refinement—they can be but simple approximations—and putting aside minor differences, it might be broadly stated that these two great western lakes *are on the same level.*

As to the geographical position of the lakes, this is most simply met.

Captain Speke heard, in 1861-2, of a lake, the Rusizi, due north of the Tanganyika Lake, and lying between latitudes 1° and 2° s., westward of the lofty Mfumbiro Peak.

Sir Samuel Baker sailed down the north-eastern side of the lake, past its abrupt cliffs of granite and gneiss, rising abruptly from the water to 1200 and 1500 feet high, and heard from King Kamrasi and many natives that it was well known as far as between latitudes 1° and 2° s., when it turns to the westward, the extent being unknown even to Rumanika, king of Karagwé.

This enormous lake, thus at least 260 miles in length, embosomed in lofty mountains on either hand, extends to and covers the site of the Rusizi Lake heard of by Captain Speke, and passes over his mountains of 1858.

Who, then, can doubt, if the data we possess be worth anything, but that *they are one and the same lake?*

The author therefore claims for Lake Tanganyika, as he did in 1859, when he stood alone, the honour of being the SOUTHERNMOST RESERVOIR OF THE NILE, until some more positive evidence, by actual observation, shall otherwise determine it.

Dr. Livingstone, by determining the division of the water-flow to the westward of his Nyassa Lake, in September, 1863, had, therefore, probably reached some of those occasional streamlets which feed the Nile.

The true sources of the Nile must be looked for in the mountains west and north-west of the Nyassa Lake, or in the great Serra

Muchinga of the Portuguese travellers, between latitudes 11° and 12° south. Thus adding 600 miles to the known course of that wonderful river, to which each new discovery adds a new interest.*

The paper will be published verbatim in the *Journal*, vol. xxxvii.

The PRESIDENT said he was sure every geographer would appreciate the ability, ingenuity, and pains which Mr. Findlay had displayed in this paper, which collated all the notices we had of the interior of Africa, whether drawn from Portuguese records or the discoveries made by our own countrymen. Mr. Findlay had got over the difficulty, as he thought most satisfactorily, of the supposed lower level of the Lake Tanganyika, upon which the whole question rested. Mr. Findlay had collated the observations made independently by Captain Speke on the one hand, and by Sir Samuel Baker on the other, at exactly the same points, and had found that they differed, on an average, by 1000 feet. Arguing from this difference, and diminishing or augmenting the height, he inferred it was extremely probable that the Lake Tanganyika might be 1000 feet above the level it was supposed to occupy, or Albert Nyanza 1000 feet lower. He agreed with Mr. Findlay that Dr. Livingstone had completely settled the question of Lake Nyassa having not only no northern outlet, but being really fed from the north. Before calling for any observations on the paper, it was his duty to state, with reference to Livingstone's travels, that two of the gentlemen were present out of the four who were going out in the expedition of search—Mr. Young, the leader, and Mr. Faulkner, as a volunteer at his own cost. These gentlemen were to sail on the 10th inst.; and, as they were about to depart so soon, he begged to introduce them to the meeting.

Mr. YOUNG said he would endeavour to explain what the expedition under his command intended to do. In the first place, they would sail from England in the Cape Mail steamer, taking with them the steel boat, provisions, and barter-goods for the journey. When they arrived at the Cape, one of our cruisers would transport them to the mouth of the Zambesi. The boat—which was made to take to pieces in sections, weighing 47 lbs. each—would then be put together; and in it they would proceed up the Zambesi to the Shiré, then up that river until they arrived at the Murchison Cataracts. Here the boat would be again taken to pieces, and carried past the cataracts to the Upper Shiré, and there screwed together again. From that point they would be able to proceed the whole of the way by water to the north end of Lake Nyassa, to within 50 miles of where Livingstone was supposed to have been murdered. For his part, he did not believe the report of Moosa, the Johanna man, who had been under him nearly two years on the Zambesi, and had shown himself to be totally untruthful.

Mr. PETHERICK said if Sir Samuel Baker's altitudes were to be adopted with regard to the Albert Nyanza, and the former observations of Captain Speke were to be corrected and brought into unison with them, in consequence of the inferior kind of instrument he employed, the statements of Mr. Findlay make the altitude of the Tanganyika sufficient to connect it with the Albert Nyanza. But in that case the connection of Victoria Nyanza with the Albert would

* The length of the Nile's course from Gondokoro to its mouth, following its major windings, is about 2400 geographic miles (or 2780 British miles). From Gondokoro, near to which, it was generally argued, ten years ago, that the southernmost head of the Nile would be found to the south end of Tanganyika Lake, is 830 geographic miles (or 960 British miles). If the source be near the Muxinga Range, it must be 270 geographic miles (or 312 British miles) still further south, so that its total course will be 3500 geographic, or 4050 British miles, —almost unparalleled by any other river.

seem very doubtful; for how could the Somerset River fall into the Albert Nyanza, which would be raised 700 or 800 feet above it? He would ask the meeting to recollect that the only actual measurements of the volumes of water of the Nile Rivers ever sent to this country were made by himself in 1863; such measurements were of the highest importance in discovering the lake origin of the Nile and its tributaries. His observations showed these results:—In latitude 9° N. nearly, at the mouth of the Bahr-el-Ghazal, the volume of water poured by the Ghazal into the Nile measured 3000 cubic feet per minute; while that conveyed, by the Nile itself, independently of the Bahr-el-Ghazal, was in round numbers 8000 cubic feet per minute. It was a common Rule of Three sum,—if it took a tract of country embracing between 5° and 6° of latitude to furnish 3000 cubic feet of water per minute to the Nile, how many degrees of latitude would it take to furnish three times that amount? The problem would show that the conclusions of Mr. Findlay, arrived at two thousand years ago by Ptolemy, were not exaggerated, and that the flow of water coming down into the Nile might reasonably be expected to come the distance that had been stated. Another observation to be deduced from Mr. Findlay's altitudes, would prove the improbability of the connection of the Victoria Nyanza with the Albert Nyanza. Independently of the 8000 cubic feet per minute conveyed by the Nile in latitude 9° N., and the 3000 conveyed by the Bahr-el-Ghazal, the Sobat affluent conveyed nearly 9000 cubic feet per minute, a greater volume of water than the Nile itself. Therefore, he would throw out this suggestion, that the Sobat might really be the river that issued from the Victoria Nyanza, as the Nile itself was derived from the Albert. The Sobat might fairly be supposed to have its source nearly as far south as the White Nile. With respect to the search expedition which was about to set sail, he entirely coincided with the President in disbelieving the report of Livingstone's death. Any man who had had a long experience of the negroes of those districts would detect a falsehood on the very face of the story that Moosa had told. It was too circumstantial for a true account. His statement that after the fight he returned with his companions several hours afterwards and found the bodies of Livingstone and three or four of his companions on the ground unmolested, was so unlike the usual mode of proceeding of these people, that it could not be correct. Every African traveller knows that the trophy most prized by savages, such as the Mavite, would be a portion of the body of the enemy they had slain; and if the poor Doctor had fallen, his body would have been cut up into as many pieces as there were savages to be gratified. It was, he thought, to be deeply regretted that the object of the expedition, now about to leave England, was merely to ascertain the certainty of the fate of Dr. Livingstone, and was on so small a scale as to preclude it from the possibility of affording the illustrious traveller, should he be in life, that relief of which he must be in need. Mr. Petherick had been in his late journey in a similar strait, and had he not most fortunately obtained supplies from one of his trading stations, he and his entire party must have succumbed.

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2. *On the Map of Africa published in Pigafetta's 'Kingdom of Congo,' in 1591.* By R. H. MAJOR, Esq., Secretary, Royal Geographical Society.

It is the usual practice at our meetings to lay before the Society some substantive fact in the shape of real recent exploration, which may extend our geographical knowledge. Such is not the case this evening. Mr. Findlay's observations have, from the nature of the

case, been, of necessity, merely inferential; but I think the high importance of the subject treated of is a sufficient reason for occupying your attention even with inferences, especially when derived from such sound premises as Mr. Findlay has adduced. But it is clear that inferential reasoning needs all the confirmation it can procure; and I propose to lay before you, in corroboration of Mr. Findlay's conclusions, information gathered by the Portuguese in Africa 300 years ago, and recorded on a map made to illustrate a printed book, in which also the amount of information which had been collected is given in detail. I allude to the account of the kingdom of Congo, printed in Italian, at Rome, by Felipe Pigafetta, in 1591, but describing observations made in Africa by Duarte Lopes, a Portuguese, from 1578 to 1587, at which time his countrymen were well established in that country.

This work, as you may suppose, has not escaped the diligent research of our learned Fellow, Mr. Desborough Cooley, who, as early as 1845, called attention to it in a Paper which is in your own possession in the 'Journal' of our Society for that year. At that time, however, the great lakes Victoria Nyanza and Albert Nyanza had not been discovered; and when I state that the old map, of which I am about to speak, contains those two lakes lying very nearly in their right position on the Equator, with another great lake due south of that which answers to the Albert Nyanza, it is obvious that we are enabled to view this map in another and a clearer light than Mr. Cooley at that time had the advantage of. The single fact of the Map exhibiting, as none of its predecessors or successors had done, these three important lakes so recently discovered, would, I think, be sufficient to justify my commending the map to your attention as one from which we may reasonably hope for enlightenment on points which have not yet been established by satisfactory modern observation. But I need not confine my recommendation of the map to this one fact, for vague and strange as its delineation will appear from this enlarged diagram to your eyes who are accustomed to neater and more systematic cartography, it contains several other items of information which I can point out as wanting in subsequent maps, until they had become matters of fact substantiated by recent explorations.

To begin at the north, it is not improbable that in the Lago Chinanda we have Clapperton's Lake Chad, although considerably north of the true position, and the Lago de Nubia may well be the Liba Lake; but of these I speak with much hesitation. I can, with far greater confidence, call your attention to the fact that on this map for the first time is laid down the great empire of Monomoezi, or Uniamuezi, occupying in a remarkably striking manner a position

between the easternmost of the two equatorial lakes and another vast lake to the south-west, exactly corresponding with the true position of that country between the Victoria Nyanza and Lake Tanganyika. But there are other items of approximate coincidence which, I think, deserve your attention. In the north-east you have the Lago Barcena corresponding with Lake Dembea, with an affluent of the White Nile issuing from it,—a fact by no means unworthy of notice, even though the indistinctness of the delineation leaves us in doubt whether the Atbara or Bar-el-Azreh may be intended.

Nor is it without significance that north-westward of the Lake Colue, which answers to the Victoria Nyanza, there occurs the word Barimboa, closely expressing Baringo, the name of the water north-west of that great lake.

If we travel further south, we find near to each other the names of Matemba and Quimbebe, suggestive of an indistinct piece of information respecting Kabebe, the court of the great Sovereign of Matiamvo, to whom the King of Casembe was a tributary. Yet further south, on the Tropic of Capricorn, we find the word Butua representing on its proper position the country of the Bechuanas. These various points, I submit, indicate a sufficient amount of approximately correct information, as established by recent exploration, to justify us in inquiring what further the author of the map can tell us with reference to the important subject of this evening. Unhappily we get not the slightest recognition of two great lakes south of these on the Equator. One only is spoken of, and I propose to show that the two great lakes of Tanganyika and Livingstone's Nyanza have been confused into one, doubtless through the information being procured from various sources. The following is the statement in the work which the map was made to illustrate:—

“The Nile does not rise in the country of Bel Gian, *i. e.* Prester John (the Emperor of Abyssinia), nor in the Mountains of the Moon, nor, as Ptolemy writes, from two lakes lying in east and west, with about 450 miles between them. For in the latitude in which he places these two lakes lies the kingdom of Congo and Angola on the west; and on the east are the empire of Monomotapa and the kingdom of Sofala, the distance from sea to sea being 1200 miles. In this region Lopez stated that there was only one lake, on the confines of Angola and Monomotapa. It is 195 miles in diameter, as he learned from the people of Angola on the west, and those of Sofala and Monomotapa on the east; and while they give us a full account of this, they mention no other lakes, whence we may conclude that there is no other in that latitude. It is true that there are two lakes, not lying east and west, but north and south of each other, and about 400 miles apart. Some of the natives think that the Nile, issuing from the first lake, flows underground and again appears; but Lopez denied this. The first lake is in 12° s. lat., and like a shell, and surrounded by very lofty mountains, the highest of which on the east

are called Cafates, and on both sides are mountains from which saltpetre and silver are dug. The Nile flows thence 400 miles due north, and enters another very great lake, which the natives call a sea. It is larger than the first, for it is 220 miles across, and lies under the equinoctial line. Respecting this lake very certain information is given by the Anzichi, near Congo. They say that there are people on it who sail in great ships, and who write, and have weights and measures, such as they have not in Congo. Their houses were built of stone and lime, and equalled those of the Portuguese, whence it might be inferred that Prester John was not far off. From this second lake the Nile flows 700 miles to the island of Meroe, and receives other rivers, the principal of which is the River Colues, so named because it issues from a lake of that name on the borders of Melinde, and when the Nile reaches Meroe it divides into two branches, and embraces a high land named Meroe, to the right of which, on the east, is a river named Abagni that rises in the Lake Bracina and crosses the empire of Prester John till it reaches that island."

Now if there be any value in this statement at all, coinciding as it does with considerable accuracy with what we now know of the relative positions of the two Equatorial lakes and Tanganyika, it is impossible to avoid identifying the latter lake with that here described as the headwater of the Nile, which is the main point to which I wished to call your attention in confirmation of Mr. Findlay's conclusions. At the same time, the latitude of 12° s. and the placing the lake described on the confines of Angola and Monomotapa plainly indicates the Lake Nyassa of Livingstone; but I submit that it is quite possible for a certain amount of accurate information to have been derived from the natives with respect to both these lakes; but that, from want of completeness in the information, confusion has easily arisen.

I would beg leave further to add a point of interesting antiquarian information respecting Livingstone's Lake Nyassa and the River Shiré. The Father Manoel Godinho, in his work entitled '*A Voyage from India to Portugal by Land in 1663*,' says,

"The way from Angola to India by land is not yet discovered; but it will not fail to be easily learnt, for from Angola to the Lake Zachaf in the interior of Ethiopia (which is 15 leagues broad, but its length is not known), the distance is less than 250 leagues. Cosmographers place this lake in $15^{\circ} 50'$, and according to a map which I have seen, and which was made by a Portuguese, who travelled for many years in Monomotapa, Maniça, Butua, and other kingdoms of Caffraria, this lake is not far from Zimbanué, which is the court of Mesura, or Marabia. From it issues the River Aruui, which falls into the Zambezi above our fort of Tete, and also the River Chire, which traverses many lands, and ultimately those of Rondo, and falls into the Cuama (the old name for the lower portion of the Zambezi) below Sena. With this prelude I now assert that whoever proposes to travel from Angola to Mozambique, and so to India, crossing the interior of Caffraria, must make for this Lake Zachaf, and descend by the rivers to our forts of Tete and Sena, and thence to the bar of Quillimane. The existence of this lake is asserted not only by the Caffres, but by Portuguese who have visited it and sailed on the rivers. We have not as yet found any inducement to explore the road of which I have been speaking."

It is needless to say that Lake Zachaf is identical with Livingstone's Nyassa. Should our illustrious Livingstone have succeeded in making his way to the court of the Casembe, it is to be hoped that the chief who reigned in 1831 and 1832, when Monteiro and Gamitto were there, may have gone to his rest and been followed by a more worthy successor. Fortunately for these explorers they had been preceded at the close of last century, as you have already heard, by their countryman Lacerda, who had been treated by the previous king with much kindness. Reverence for their ancestors is a matter of religion among the Cazembe, and Gamitto's party would in all probability never have escaped from the clutches of the Muata or chief, had not the latter been persecuted in his dreams by the ghost of his father, who complained that Lacerda's spirit was constantly remonstrating with him on account of the detention of his fellow-countrymen.

The PRESIDENT, in returning the thanks of the Society to Mr. Major, said his paper corroborated to a considerable extent the ingenious suggestions of Mr. Findlay, drawn as the information was from sources of greater antiquity. Though the different lakes, as placed in the old map, were not in precisely the same position they are now known to occupy, yet the main fact of a great body of water flowing so far from the south to the north and supplying these lakes was a remarkable confirmation of the truth of recent discoveries. There were few persons among them so well acquainted as Mr. Major with the history and progress of geography.

Mr. FINDLAY said, with reference to Mr. Petherick's remarks, if Captain Speke's observations were to be corrected by Baker's, the result would be to raise the Victoria Nyanza sufficiently for it to flow, not up-hill, but in the way Sir Samuel Baker pointed out. Although Captain Speke had made the river to issue from the Victoria Lake, it was manifestly impossible that he could ever have seen the lake at that point, owing to the conformation of the land at Ripon Falls. There might have been another lake in this part. It was a fair subject for doubt whether such a lake as the Victoria Nyanza existed in the form described. It was possible there might be several lakes. The quantity of water passing from the Sobat was too large to account for its known area of drainage. It was a considerable affluent with a very small basin. In fact, there were still many difficulties with regard to the Nile, and he hoped Livingstone would yet be found living and able to clear them all up. At present, with the data before us, it was impossible to escape from the conclusion at which he had arrived.

The PRESIDENT said, in the absence of Sir Samuel Baker, he might communicate his views with respect to the best method of settling this great question of the ultimate watershed of the Nile. His recommendation was that the Pasha of Egypt should be persuaded to undertake an expedition, with a view to the annexation of the banks of the White Nile and the Equatorial Lakes to Egypt; to send detachments of armed men, forming a force of which Sir Samuel Baker would be happy to take the direction. The subject would, probably, sooner or later, be brought under their consideration by Sir Samuel Baker himself.

Mr. BAINES, in reference to the doubts recently expressed, that the Zulu Kafirs could have passed across the Zambesi from Natal, said the Zulus were originally a very small tribe, but had become a very large one by the amalgamation of a great number of other tribes under the chief Chaka or "Battle-axe."

This powerful chief took from them all their weapons, leaving only a shield and one spear, and the man who went into action and lost his spear was bound to bring away that of a dead enemy, or lose his life. When a party was sent out on an expedition, if they failed they dare not return, for the penalty was death. Mōsélekátsé himself went out once, and, failing in his object, he migrated northward, instead of returning to his tribe. It was he who inflicted such deadly injuries on the Boers, who had been obliged to leave the Cape Colony in consequence of the depredations committed on them by the Frontier Kafirs. Mōsélekátsé, in course of time, moved further and further northward, and he was now established in the Matabeli country. This party of Zulus were originally five or six hundred strong; and they scoured the whole country, murdering every man and woman, and taking prisoners the boys, whom they brought up among their own tribe. Other Zulus had broken off from the main body in the same way as the Matabele, and had gone still further to the north. When he (Mr. Baines) was on the Zambesi, with the Livingstone expedition, a party of these Zulus had come northward, and were offering their services to the Portuguese in the war then being carried on with the natives. Now, if these people could advance as far as the Zambesi, he saw no difficulty in other tribes of Zulus, who had preceded them some years, passing through the country to the north-western shore of Lake Nyassa.

Mr. WALLER thought it was just to state to an assemblage who felt so much interest in the fate of Livingstone, that letters had arrived from Zanzibar that day, by which it appeared that doubts prevailed in that place as to the story of the Doctor's death. A letter from Mr. Alington assured him that he had the gravest doubt as to the truth of the story set afloat by Moosa, who had told different stories to the Arabs in Zanzibar from that he had given our Consul. This was important, because we knew from Colonel Rigby, who had returned from Bombay, that Moosa had told a different story to the sepoys, and it was quite by accident that Colonel Rigby took the depositions of these men. It was a satisfaction to find that doubts regarding this story prevailed not only here and in India, but at Zanzibar itself.

The PRESIDENT, in conclusion, said he could not but feel intense gratification at hearing the opinions that had been expressed with regard to the probability of Livingstone being still alive. At a former meeting he almost stood alone. With the exception of Captain Sherard Osborn, he had scarcely anybody to support him in the doubts he then expressed. He relied upon Mr. Young, a gentleman who knew this man Moosa well, and who knew the character of these fellows, that they were great liars, and never to be depended upon. He had still a well-founded hope that his friend Livingstone was yet pursuing his adventurous journey into Central Africa, there to settle definitively the great problem on which Mr. Findlay had thrown so much light by his able investigations.

Fourteenth Meeting, 24th June, 1867.

SIR RODERICK I. MURCHISON, BART., K.C.B., PRESIDENT, in
the Chair.

PRESENTATIONS.—*H. A. Glass, Esq.; E. T. Higgins, Esq.*

ELECTIONS.—*C. J. Bayley, Esq., C.B.* (late Governor of the Bahamas); *Frederick Addington Goodenough, Esq.* (of Calcutta); *Nathaniel Plant, Esq.; General Sir George Moyle Sherer; the Hon. Richard Gillert Talbot.*

ACCESSIONS TO LIBRARY FROM JUNE 3RD TO 24TH. *Donations.*—‘A new Theory of the Cause of Tides.’ Presented by the Author, J. Culbertson. ‘Die Gestalt der Erde und der Meeresfläche und die Erosion des Meeresbodens.’ By von Bischof. Purchased. ‘Description of a new Double Sextant.’ By Capt. George, R.N. ‘Remarks on Dr. Livingstone’s Last Journey.’ By Alex. George Findlay, Esq. ‘Dynamical Theory of the true figure of the Earth.’ By F. C. Bakewell. ‘Humboldt: Correspondance scientifique et litteraire, precedé d’une Notice et d’une Introduction par M. de la Roquette.’ Donor, the President. ‘Die Nikobaren: zur Colonisation dieser Inseln durch Preussen.’ Franz Maurer. With 4 maps. Berlin, 1867. Purchased. ‘Reise der Oesterreichischen Fregatte *Novara* um der Erde.’ (Linguistic, vol. i.) Dr. F. Müller, Vienna. ‘Five Years in Japan.’ By van Meerdevoort. Purchased. ‘Obras Publicas do Brazil.’ 3 vols., including many Geographical Papers, particularly relating to the Rivers Amazons, Madeira, Purus, Araguaya, etc.’ Presented by T. Whitfield, Esq. ‘Notice sur l’Hypsomètre de la Suisse et l’Orographie des Alpes.’ By J. M. Ziegler. Translated by P. Bourrit. ‘Papers relating to the aboriginal Tribes of the Central Provinces of India.’ By Rev. S. Hilsop. Donor, Sir Stafford Northcote. ‘The Free Indian Tribes of Central America.’ By F. Boyle, Esq. ‘Berichte ueber die Biologisch-Geographischen Untersuchungen in der Kaukasus Landern.’ By Gustav Radde, Tiflis. Donor, the Author. ‘Nivellement de precision de la Suisse.’ By A. Hirsch et E. Plantamour. ‘Synopsis of Star-fish in British Museum.’ By Dr. Gray. Presented by the Author. ‘Sketches of Japanese Manners and Customs.’ By J. M. Silver, R.M.—with facsimile pictures of native artists by Day and Son. Presented by Alfred Davis, Esq. ‘Frobisher’s Three Voyages.’ Donors, the Hakluyt Society. ‘Grönland und die Grönlander.’ By Henrick Helms. Purchased.

ACCESSIONS TO THE MAP-ROOM SINCE THE LAST MEETING OF 3RD JUNE, 1867.—Admiralty Chart of Middleton reef, South Pacific Ocean. Surveyed by Sir H. M. Denham, C.B. H.M.S. ‘Herald,’ Chromolithographed. Presented by the Hydrographical Office, Admiralty.

Before the reading of the Papers, the President announced that the young Prince who sat upon his right hand was his Imperial Highness the Duc de Leuchtenberg, an ardent mineralogist, and already President of the Imperial Mineralogical Society of St. Petersburg. It gave him (the President) sincere satisfaction, after the kind and hospitable reception he had met with in former years in Russia, to be honoured by the presence of a member of the Imperial family, who was so sincere a lover and promoter of science.

This sentiment having been cheered by the Assembly, his Imperial Highness returned thanks, in English, for the notice taken of him, and spoke in

warm terms of the benefits conferred upon his country by the geological labours of Sir Roderick Murchison, and for which the Russians were truly grateful.

The following Papers were then read :—

1. *Notes on the Russian Harbours of Possiette, Wladivostock, Nakhodka, and Olga Bay, on the Coast of Manchuria.* By the Rev. W. V. LLOYD, R.N., F.R.G.S.

THE author visited the Russian settlements on the coast of Manchuria in the summer of 1866, when he was serving as chaplain on board H.M.S. 'Scylla,' Capt. Courtenay. The vessel left Nagasaki, in Japan, on the 20th of July, and arrived at Possiette (now called Novogorodski) on the 25th. The general aspect of the country was dreary, being hilly and destitute of timber; a dozen log-houses marked the site of the Russian settlement. Russia has found here what she has long coveted, a harbour where her fleets can pass in and out during the winter season; perfectly sheltered by surrounding hills, with deep water, an impregnable position, and a good supply of coal on the spot. The Tu-men River, the boundary between the newly-acquired Russian territory and Korea, runs within 30 miles of the settlement. The Chinese or Manchu town of Hun-chun is situated 25 miles above its mouth, and contains a population of from 6000 to 10,000. Russia has taken complete military possession of the coast, as well as of the Khinka Lake, in the interior, and the right bank of the Usuri River, a branch of which flows out of the lake, and is navigable down to the Amur. Drafts of regiments or of sailors are established every ten miles, and the men are diligently employed in making the great military road, which is to connect the coast settlements with the Amur. A telegraphic line was expected soon to be laid between Novogorodski and the Amur, between which and St. Petersburg there is already telegraphic communication. The protection of a Russian garrison had induced more than 300 families of Koreans to establish themselves within the Russian frontier.

The next settlement to the north of Novogorodski is Wladivostock, or Port May. The thermometer here, in January to March, sometimes descends as low as -15° to -20° Fahr., and the harbour is closed up by ice during those months. The land is of excellent quality, and moderately covered with timber. With the exception of seven foreign merchants, the settlement may be said to be purely military, like Novogorodski; but it is more flourishing, and it derives great importance from being the nearest coast station to the head of navigation on the Usuri River, which will form the principal means of communication with Eastern Siberia, owing to

the lower part of the Amur, further northward, being frozen up during several months of the year. The nearest practicable route from Wladivostock to the point where steam navigation on the Usuri commences is 200 miles. The River Suifun, at the head of Guérin Gulf, a distance of about 20 miles from the settlement, is navigable for good-sized boats to within 40 miles of the Lefu River, which flows northerly towards the Usuri, and empties itself into the Khinka Lake. A small steamer was soon expected to ply upon the Lefu. A thorough official survey was made of this important line of communication, in 1859, under the direction of Colonel Budogorsky. The length of the Usuri, which is the most important southern tributary of the Amur next to the Sungari, is 497 miles. Lake Khinka is about 60 miles long by 40 wide, and its banks are now dotted with Cossack settlements.

This paper will be published *in extenso* in the 'Journal,' vol. xxxvii.

The PRESIDENT said the paper was a popular sketch of the present condition of the Russian settlements in Manchuria, part of the information being derived, as stated by the author, from Russian sources. He was glad that Mr. Lloyd bore testimony to the readiness with which Russian officials communicated information respecting the geography and productions of the countries they occupied.

Captain SHERARD OSBORN said that, in listening to the paper, he was impressed with the great fact that the Russian inhabitants and Government in Siberia were struggling with enormous difficulties in their endeavours to obtain access to the eastern seas and a more genial climate. This desire was a very natural and legitimate one. The great population of Siberia, extending from Orenburg to the mouth of the Amur, had to contend with serious physical difficulties in obtaining easy communication with the east and south. The harbours on the eastern coast were frozen up for a considerable portion of the winter. He had himself seen ice two feet in thickness in the bay, and, if he remembered rightly, ice was the first article of export from Russian Manchuria. Englishmen ought to be the first to lend a helping hand to these northern settlers who were struggling with the difficulties of such a climate, and to encourage them to find a better outlet than they had at present to those tropical regions of Asia, where alone could be found the products necessary for the wants, comforts, and luxuries of European existence. The fact that telegraphic lines were being extended from the Amur to Lake Khinka was well worthy of attention. It was remarkable that the telegraph and the highway—those two great desiderata to the importance of which the English Government were only just awakening in British India—were actually established in advance of immigration in this new Russian territory; and it did great credit to the Russian Government that they should so early appreciate their importance to the settlers struggling with so severe a climate.

Mr. SAUNDERS observed, that many of the rivers named in the old Jesuit maps of the shores of Chinese Tartary appeared to have escaped the notice of the English, French, and Russian marine surveyors, who had made charts of those coasts in our time. One of those rivers, the Tourho, was alluded to in the first accounts received here of the Russian acquisitions on the Usuri; and it was only to be found on the Jesuit maps. He hoped that attention would be paid to those old maps in future surveys.

The PRESIDENT said, it was always the practice of Russian geographers to

retain the names used in the countries they explored. Thus, the Jaxartes of the ancients was the Syr Daria of the Russians, and the Oxus of the ancients their Amu Daria.

The Rev. Mr. LLOYD said that the Russian navy and surveyors had gone very regularly over that portion of the coast which Mr. Saunders had referred to; and the Master of the *Scylla* was much indebted to the Russian officers while on his visit there, not only for the information they gave, but also for the admirably executed maps which they allowed him to see. A mistake in the English charts was detected and made good by comparison with the Russian charts. The Russian determinations had been made with great accuracy.

2. *On Communication between India and China by the line of the Burhampooter and Yang-tse.* By General Sir ARTHUR COTTON, R.E.

THE Author stated that orders had been lately issued to survey the line of country in Lower Burmah or Pegu as far as our own frontier, in the direction of the Chinese province of Yunan, with a view to the establishment of a line of route between our Indian possessions and China; but he thought it very strange that so important a question as internal communication between India and China, should be treated in such an imperfect way. No attempt had been made to consider the real question, which was, what would be the best line for such a communication. He conceived the question of throwing open all India, with its population of 200 millions, to all China and its 400 millions of people, was of such great importance that it required a much more serious consideration than had yet been given to it. There were three conclusive objections to the connection with Rangoon. 1st. It would lead the traffic to an insignificant port, instead of directing it to the great port of India and the seat of Government. 2nd. It would not connect the great body of India with China, but only an insignificant province containing two millions of people. 3rd. There were 900 miles of land-carriage between Rangoon and the Yang-tse; whereas it was essential to approach much nearer the great line of water-carriage in China, by which all the great traffic of the country was carried on.

The line which best fulfilled the necessary conditions of the shortest possible land-carriage was the direct one between the Burhampooter and the Yang-tse, the distance between the navigable parts of which was only about 250 miles. This was the only interruption in a prospective line of internal water-communication between Kurrachee and the whole interior and seaboard of China, for the Indus and the Ganges would be sooner or later connected by means of a canal between the Sutlej and the Jumna. The line thus suggested had the advantage of being not only the shortest,

but also that which would connect the heart of China with that of India, and would not require to be led through any foreign intermediate country, as was the case with the southerly line through Burmah. The great superiority of water over land transit for extensive trade was pointed out by the author, especially in countries where the distances were computed by hundreds of miles. The chief apparent difficulty in the line which he recommended was the elevated district of country which was recorded to exist between the Burhampooter and the Yang-tse. No exact information, however, had been published relative to this region, for no European had crossed it; and he concluded his paper by sketching out a plan of exploration which he considered ought to be at once commenced, and which might be carried on by parties ascending the Irrawaddy, the Burhampooter, the Salween, and the Yang-tse in steamers, and then examining the intermediate tracts.

The paper will be published entire in the 'Journal,' vol. xxxvii.

The PRESIDENT said that the project suggested in this paper reminded him of the vast undertaking of Peter the Great, when he devised the grand plan of uniting the rivers of Russia by means of canals. There was a great difference, however, in the nature of the two countries. In Russia the river basins were separated from each other only by districts of small elevation, while the region between the Yangtse-Kiang and the Burhampooter was apparently traversed by almost impassable mountains. The question was truly geographical; and as such well fitted for discussion by this Society. Some years ago a paper of a similar nature was read before the Society by Captain Sprye, who suggested a route much further to the south-east, from Burmah to the western provinces of China.

General G. BALFOUR said the question discussed in the paper was one of great geographical and commercial importance. Having served for many years in China, he had an opportunity of ascertaining the fact that there was not a province in that country more celebrated for its resources than the province of Se-chuen, with which Sir Arthur Cotton's line would connect our Indian possessions. Se-chuen was 1200 miles from the sea-coast, and hence, if a direct internal communication between that province and India could be established, it would be an immense advantage. Dr. Gutzlaf often insisted on the importance of opening a route between India and China, and he pointed out the line from Assam to Se-chuen as the most desirable. The information we had of the nearest approach to Se-chuen was derived from Captain Wilcox, and was now forty years old. The distance between the two extremities of the route between Assam and China was not more than 150 miles, and the barrier separating the two countries might yet be overcome. The project for opening such a communication was one highly deserving the encouragement of this Society. Se-chuen possessed mineral wealth of great extent. Its inhabitants were a hardy, brave race, and it was very fairly peopled, having more than 200 persons to the square mile. He saw no reason why we should not encourage explorations to discover a practicable route over the mountains which lay between the valley of the Burhampooter and that of the Yangtse-Kiang.

Dr. MCOSH was pleased to find so distinguished an officer as Sir Arthur Cotton lending his engineering talents to the question of opening a direct communication from Assam into China. Thirty years ago, in his 'Topo-

graphy of Assam,' he (Dr. McCosh) brought it to the notice of the Government of India; six years ago he read a paper on the same subject before this Society; but nothing had yet been done. He was in Assam when tea was just discovered, and foresaw the advantages of such a communication. Had a road practicable for beasts of burden been constructed thirty years ago, the ruin which has lately fallen upon the tea-plantations of Assam might have been averted. The readiest means of restoring them to prosperity was by establishing ready access to Chinese labourers from China. But he could not give his approbation to the route proposed by Sir Arthur Cotton due east from Sudiya into Se-chuen. This route had long been known as the Mishmee Pass. In 1826 Capt. Wilcox explored it as far as Dea-ling, and in 1844 Capt. Rowlatt explored it as far as Too-pang. In 1855, two missionaries, Krick and Mowey, attempted to cross it, but they were both murdered by the Mishmees. When Capt. Rowlatt was at Too-pang he met a party of Chinese traders, who were prevented by a fall of snow from returning home, and had to remain there till next summer. The country is full of difficulties and dangers; in fact, the main chain of the Himalaya here takes a bend to the south, and a great part of the year the passes are closed by snow. The rivers are tremendous torrents, passable only in baskets suspended from a rope stretching from side to side, the baskets being pulled over by ferry-men. In fact, the great rivers of Martaban, Siam, and Cambodia must be crossed, and, for anything we knew to the contrary, the mysterious river of Lah-sah. Moreover, the line is too far north for commerce. Bhamo, on the Irrawaddy, is the great entrepot of China trade, and any route must necessarily pass through it. A very good route could be constructed from Jorhath, in Upper Assam, over the Pat Koye Range to Mogaung and on to Bhamo. By this route the Burmese army invaded Assam. But the hill tribes on the route—the Singphos and Mat-tucks—would be very difficult to control. The route *viâ* Dacca, Sylhet, Banskundie, across Munnipoor, to the Ningtee or Kyen-duen River, thence across Upper Burmah to Bhamo, and thence on to Yunan, appeared to the speaker to have the advantage over every other route. Indeed, a footpath already exists, and it is necessary only to widen it and establish security by a police. A railway is now under construction from Calcutta to Dacca, and it might easily be carried on to Banskundie. Banskundie to Monfoo on the Ningtee River is distant 200 miles, and the country generally easy. From Monfoo to Bhamo the distance is about 150 miles. At present there is much intercourse between Munnipoor and Ava. He had no hesitation in pronouncing that line infinitely preferable to all others.*

SIR ARTHUR PHAYRE said that no project was better calculated to interest this Society or the world at large than that which had been brought forward by the author of the paper. The points selected for the connection of the Burhampooter and the Yangtse-Kiang were certainly those which would strike any one, on looking at the map, as the two points between which the line of communication should be made; but he was inclined to agree with the remarks of Dr. McCosh, in which he stated that a more southern line would be found the more practicable. His (Sir Arthur Phayre's) reason for this opinion was, that although there had been no survey and no reconnoitre between those two points by any European, still there existed a caravan-road from the province of Yunan to the town of Bhamo, which Dr. McCosh mentioned. *Primâ facie*, therefore, that would seem to be the most probable route for an eventual communication between the rivers of the two countries.

* [Since the meeting I have been favoured by Sir Macdonald Stephenson with a copy of his magnificent map of railways projected upon the Indo-Chinese frontiers, and find he has selected the identical line I proposed in 1860. Already this line is finished as far as Khooshtea, the first link between Calcutta and Canton.—Dr. M'C.]

Mr. CRAWFURD said he heartily wished he could agree with the project of Sir Arthur Cotton, for he should be happy to coincide with a gentleman who had, to his (Mr. Crawford's) certain knowledge, rendered more substantial service to India than any other man he could name. It would be very desirable to establish a rapid water-communication between the 200 millions of British subjects in India and the 400 millions of Chinese. The line of communication proposed between the Burhampooter and the Yangtse-Kiang by Sir Arthur Cotton, was only 250 miles in length; but it lay through the worst country in the whole world,—a congeries of mountains, divided by very narrow valleys, which would hardly allow the sun to penetrate them, and covered with a deep jungle of forests abounding in leeches, so that a traveller could not pass through them without losing nearly half the blood in his body. The country was also inhabited by one of the most savage and warlike tribes in all the east. But, supposing the difficulties to be surmounted, the western province of China, to which the route conducted, was almost the worst and most unproductive province of that empire. The same objection might be urged against the route recommended by Captain Sprye, which terminated in the province of Yunan. Se-chuen was equal in extent to the United Kingdom, and contained a population of about 133 inhabitants to the square mile. Yunan was equal to twice the size of Great Britain, and its population was 55 inhabitants to the mile. It was not from such countries as those that we were to expect a profitable trade. Our real intercourse must be with the eastern provinces of China. The staple product of Se-chuen was rhubarb, and a little of that article would go a long way. The quantity imported into this country was 130,000 lbs. weight, of the value of 56,000*l*. That would afford no great trade, even supposing all our rhubarb came from Se-chuen. The Yangtse-Kiang was navigable for about 960 miles, and the distance not navigable was about 600 miles further. Du Halde stated that the territory of Ching-foo, the capital of Se-chuen, was the only level spot in the whole province. He believed that the route pointed out in the paper was impracticable and delusive.

Mr. G. CAMPBELL said that they must all feel that the very sanguine expectations expressed by Sir Arthur Cotton would not be realized in their own day or in that of their children; but, on the other hand, a direct line of communication for social intercourse and light traffic between the two countries of India and China might be established even in our own day. He regarded the immigration of Chinese into India as the most important point which had been mooted this evening. He believed that, if a route could be opened to Assam, that province would become one of the most productive in the world. It possessed tea-fields, and also produced coal. The Burmese route would probably be the easiest physically, but there were very great political difficulties, and the distance was much greater. Every effort should therefore be made to open the direct route by a mountain road similar to the Hindostan and Thibet road. If the Chinese Government could be induced to agree with the British Government for the establishment of such a route, enormous advantages might be obtained.

Mr. SAUNDERS said that the immediate proposition of Sir Arthur Cotton was not so impracticable as might be supposed from some of the remarks which had been made. The immediate proposition was to ascertain what was the nature of the difficulties which would have to be overcome in the establishment of a line of communication. The only generalization arrived at relating to the inhabitants of the district through which Sir Arthur Cotton's proposed route lay was that they were of the Shan race; and what we knew of that race farther south was highly favourable to them. It might, therefore, be expected that they would not present any formidable difficulties if they were approached cautiously. The evidence we possessed with regard to the mountains favoured the belief that they were considerably depressed below the

elevated mass which encircled Thibet. There was at the present time a great highway traversed by mules between Bhamo and the Yang-tse. There was some reason to believe that an English establishment existed at Bhamo in former days. He believed that the Chinese authorities would not oppose the removal of restrictions to intercourse across the Indian frontier, if it were urged by our own Government.

Sir ARTHUR COTTON said that it would be clearly seen that the principal objections which had been brought against his route were only *supposed* to exist. His proposition was to go and see whether they did exist. He hoped that persons would not be stopped by imaginary difficulties. It was a mistake to state that Se-chuen was a miserable province. On the contrary, it was a magnificent country, with a population of ten or twenty millions. If we could once enter the Yangtse-Kiang we should have all China at our feet. It conducted us into the very heart of the empire. He only proposed at present that we should explore the country between the Yang-tse and the Burham-pooter.

The PRESIDENT congratulated the Society on the discussion of this evening. Nearly all who had spoken acknowledged the importance of establishing, if practicable, a communication as had been indicated by the author of the paper, whilst all agreed in thinking that the suggestion for an exploration of the country between the great empires of India and China was worthy of encouragement.

3. *Notes of a Journey to the North-west of Peking.* By JONES LAMPREY, Esq., M.D., F.R.G.S.

THE northern provinces of China were not open to English travellers until the autumn after signing the Treaty of Peace in 1860, and the restrictions were removed gradually; permission to make excursions into Manchuria, Shansi, and Shantung, not being granted before the spring of 1862. The facilities for travelling are abundant; the country is everywhere traversed by tolerable roads, there are excellent Tartar ponies, an abundance of mule-carts, and innumerable inns, although these, in remote places, give sometimes very inferior accommodation. Dr. Lamprey left Peking on his journey to investigate the productions, methods of tillage, manufactures and customs of the country to the westward, on the 23rd October, 1861. In many of the towns and villages passed through, he was the first European that had been seen by the inhabitants. But he was generally treated with civility, and opportunities were afforded him of pursuing his investigations. Throughout the rural districts a small line of unploughed land, about a foot wide, was the only boundary between the properties of neighbours, so that the absence of conspicuous boundary lines was a peculiar feature of the landscape in the level country which extends from Peking to the Shi-Shan or Western Mountains. The road sometimes led through thick plantations of pear, apple, peach, poplar, and other large timber trees, all planted in regular rows; the villages were surrounded each by a mud wall and ditch, and some of the towns had well-built crenelated

walls. On the 28th he crossed the Lu-Lee-Ho River, flowing from the north, and on the 1st of November arrived at the famous Buddhist temple of Shan-Fong-Shan in the mountains, which he described in his paper with great detail. In the neighbourhood of the temple he was entertained in the most hospitable manner by a Chinese gentleman who owned landed property in the neighbourhood, and who had introduced himself to the traveller with open-hearted frankness. Under the guidance of his host he made several excursions and investigated the marble quarries and farming operations of the vicinity; cotton and tobacco were here cultivated. The marble quarried here was conveyed to Pekin; and Dr. Lamprey saw several carts starting on their journey, surmounted by the yellow flag, which showed they were in the Imperial service. On reaching the *Mausolea* of the Emperors of the Tsing dynasty the mandarin in command refused him permission to visit the tombs, but allowed him to ascend a hill which overlooked them, from which he distinguished the six great tombs of Shunchi, Kanghi (17th century), Yung-Ching, Kien-Lung, and Kia-King (18th century), and Tan-Kwang, who ascended the throne in 1821. On the 6th November the traveller reached Powting-Foo, a clean and flourishing city, where he stayed two days. On the following days the weather became severely cold, and violent dust-storms overtook the party on the high road; on the 9th the journey terminated by their arrival at Tien-tsin.

The paper will be published at greater length in the 'Journal,' vol. xxxvii.

Besides the suite of the Duc de Leuchtenberg, including the celebrated mineralogist General Kokscharof, formerly the associate of Sir Roderick Murchison in his exploration of Russia, and the distinguished French savant M. de Cloizeaux, the meeting was attended by a number of young Japanese gentlemen, who are under the tuition of the Rev. W. V. Lloyd.

In adjourning the meeting, the President congratulated the Society on the termination of a very successful session.

ADDITIONAL NOTICES.

(Printed by order of Council.)

1. *Volcanic Eruption in the Azores.*

(Communicated by the BOARD OF TRADE.)

A VOLCANIC eruption of short duration occurred in the month of June last, in the bed of the sea, near the island of Terceira in the Azores. Information of it was communicated to our Vice-Consul at Fayal, by J. Read, Esq., H.B.M. Vice-Consul at Terceira, in a despatch dated the 6th of June. He said, "I am induced to acquaint you that a submarine explosion took place on the 2nd instant, at about six or seven miles to the north-west of Ponta da Serreta, in this island, under the impression that the commander of any of Her Majesty's ships touching at Fayal may be induced to visit the locality for the purpose of ascertaining the situation and extent of this new danger. Yesterday the Intendent of Marine here proceeded in a boat to the spot, but could not approach as near as could be wished, on account of the emission of steam and tremendous stones that at intervals were hurled into the air. It is calculated that an islet or shoal is there formed, extending, as well as could be judged, about three miles in an east and west direction. It is distant about three miles from the Serreta rocks, as set down in Captain Vidal's chart of the island."

Information was subsequently received by our Vice-Consul at Fayal to the effect that the eruption still continued on the 6th of June, and that an islet or shoal was formed to the extent of $2\frac{1}{2}$ miles east and west, distant 9 miles from Serreta Point, bearing north-west by compass; lat. $38^{\circ} 52' N.$ and long. $27^{\circ} 33' W.$ The Intendent of Marine of the Azores has since reported that on the 17th of the month the volcano was completely extinct, that all vestiges had disappeared, and no soundings could be found on the spot at a depth of 320 metres.

2. *Notes on the Yang-tse-kiang, together with Corrections of the existing Charts.* By J. MINETT HOCKLY, R.N., Harbour Master, Shanghai.

[Extracts.]

THE nature of the Yang-tse below Hankow is familiar to all members of the royal and mercantile marine; but that important portion which lies far beyond the limits hitherto thrown open to foreigners, has obtained comparatively little attention. So long as the rebellion was in existence, attempts to explore the Yang-tse, or the districts on its shore, were attended with considerable risk; and since the capture of Nanking and the consequent extinction of the Taiping insurrection, neither the Chinese Government officials nor the representatives of foreign powers have offered any encouragement to adventurous Europeans who might otherwise be tempted to encounter the dangers and inconveniences incident to a voyage of discovery. At the same time it is only fair to the generally inoffensive natives of China to state that, in the opinion of those whose knowledge of Chinese character renders them most competent to give an opinion on the matter, the perils of such a journey are largely over-estimated. A serious error was made in despatching so formid-

able a party to accompany Captain Blakiston's expedition in 1861; for, although the list of "four Europeans, four Sikhs, and four Chinese," appears at first sight sufficiently moderate, one European or at least two, together with one or two natives, would have excited no suspicions, and the expedition would in all probability have succeeded in its original design, of penetrating into Thibet and thence to North-Western India, *viâ* the Himalayas. The Chinese are naturally and essentially jealous and suspicious, and this fact should be borne in mind whenever another attempt shall be made to explore the portion of the Yang-tse left unvisited by Captain Blakiston. As it is, we owe him a debt of gratitude for the information he has succeeded in collecting with respect to the geography of at least 900 miles of the river, which, but for him, would have remained unknown to the present day.

It is difficult to obtain a correct estimate of the actual length of the Yang-tse-kiang. Its source is in about 100° E. long., and it falls into the Yellow Sea in $121^{\circ} 50'$ E. Its direction, therefore, from west to east corresponds to at least 20° , but, as throughout its entire course it persistently winds and often doubles upon itself, the estimate of a total length of 2000 miles may be regarded as rather within than beyond the mark. This vast extent is sufficient to account for the reverence wherewith the Chinese regard the Yang-tse. They call it, in ordinary discourse, *Ta Kiang*, or "Great River," *Chang Kiang*, or "Long River," and still more frequently *Kiang* or "The River." A favourite proverbial saying is, "As the ocean is boundless, so is the Yang-tse bottomless," and the greatness of the river enters in various ways into the everyday colloquial language. The name Yang-tse-kiang has received various interpretations, but that to which most credit is now attached by Chinese scholars is, "The River of the Kingdom of Yang," in allusion to an ancient division of China, whereof the river was the southern boundary.

The river has been explored as far as Ping-shan (long. 104° E., lat. $28^{\circ} 30'$ N.), but beyond this point, and as far as the embouchure of the Wu-liang River (long. $100^{\circ} 30'$ E., lat. 22° N.), which joins the Yang-tse on the left bank, the stream is navigable. The upper waters are dangerous, in consequence of the rocky nature of the bottom, and of the mountainous regions in the vicinity, which give rise to constantly recurring torrents. The Wu-liang, however, falls into the Yang-tse at a point nearly upon the boundary of the productive districts; and therefore, for commercial purposes, it would be useless to attempt navigation any higher than the city of Li-kiang, which stands at the junction of the two rivers.

If we draw up a list of the most important articles of export, we shall find that the Yang-tse districts almost exclusively supply foreign markets with those articles of luxury and utility for which we are indebted to China. Thus, silk finds its way to Shanghai through the Wusung River, an important tributary of the Yang-tse; and the rarer description of yellow silk is produced in Szuchuan alone, and can find an exit only by the Long River. The most serviceable descriptions of black and green teas are grown upon the slopes of An-huri, Hupeh, and Hunan; the yellow cotton, manufactured into the fabric known as Nankeen, grows within sight of Yang-tse in the immediate neighbourhood of the celebrated city of Nanking. The coal-fields of Hunan are inexhaustible, as also are the alum-pits of the same province and of An-huri. Copper and iron mines abound in Szuchuan, Yunan, and Hupeh, and although the traffic in metals is at present extremely limited, a time must eventually come when this branch of commerce will be thrown open to foreign enterprise. China ware (Kiangsi), orpiment (Yunan), Indian ink (An-huri), musk (Thibet, Yunan, and Szuchuan), salt (Szuchuan), tobacco (Hupeh), paper (Hupeh), timber (Szuchuan and Kiangsi), are conveyed from their place of production solely by the Yang-tse, which hence will be seen to bear no inconsiderable share in furthering the commerce of the whole world.

The open ports on the Yang-tse are the following:—

Shanghai, the largest and most important centre of trade in the valley of the Yang-tse. It deserves especial notice on account of its having been the first port to which the system of a foreign inspectorate of customs was applied. During the rebel occupation in 1853-55, it was arranged between the English, French, and American consular representatives and the Imperial authorities, that, pending the restoration of the rightful authorities, the duties on foreign imports and exports should be collected by foreign commissioners, nominated by the consuls under the approbation of the Chinese. So acceptable did this arrangement prove to all parties concerned, that, upon the opening of other places, the system at first adopted as a merely temporary measure to meet a merely temporary emergency was extended, and is now in full operation at all the treaty ports. In 1861 the trade of Shanghai received an additional impulse in consequence of the opening of Chin-kiang, Kiu-kiang, and Hankow. Since then the amount of trade may be approximately estimated from the subjoined statement of revenue collected during each subsequent year:—

Shanghai—Revenue accruing from duties on imports, exports, opium, and tonnage:—

Year.	£.	Year.	£.
1861	390,042	1864	706,648
1862	1,098,748	1865	687,404
1863	1,099,240		

Total for five years .. £3,982,082

At Shanghai, as at all the ports in China open to foreign flags, the lion's share of the trade, both in imports and exports, falls to Great Britain. Thus, in 1865, the total trade of the ports with *foreign* countries amounted to 39,738,983*l.*, which was thus distributed:—

	£.
Great Britain and British Possessions	34,167,531
United States of America	2,010,015
France and the Continental States	2,019,959
Japan	1,541,478
	<hr/>
	39,738,983
Add to which, for trade with other <i>Chinese</i> ports ..	49,435,556
	<hr/>

Total trade of the open ports for 1865 89,174,539

Chin-kiang stands on the right bank of the Yang-tse, nearly opposite the affluence of the Yun-ho, or Grand Canal, which connects the Yangtse with the Yellow River and the Peiho, and thus would appear naturally to direct the trade of the northern provinces into the Chin-kiang market. In the year 1842, when this city was captured by the English expeditionary force, it was a place of very considerable importance; but it has since then been frequently made the bone of contention between Imperialists and rebels, by whom its suburbs have been destroyed and its trade completely annihilated. Moreover, the Yellow River has of late years received no attention at the hands of the Government, and consequently the mouths of the Grand Canal opening on that river have silted up, thus interrupting the communication between the northern producing districts and the Yang-tse. Foreign merchants who have settled at Chin-kiang have been grievously disappointed in their expectations of a remunerative trade, more especially as the absence of any safe anchorage-ground has hitherto prevented this place from becoming the outlet for the produce even of the surrounding districts. This drawback is at present in process of removal by the construction of artificial basins, where, it is hoped, junks laden with tea and cotton from the neighbourhood of Nanking will lie. The native governor of the province has undertaken these works, and up to a recent date they were progressing satisfactorily. In the absence of some pro-

vision of the kind, Chin-kiang could never become valuable as a centre of foreign trade, as the rapid current of the river and otherwise bad anchorage throw very great difficulties in the way of lading, discharging, or transhipping cargo.

Kiu-kiang is the outlet for the trade of the Poyang lake, which opens into the Yang-tse a little below the city. A considerable amount of the trade in black and green tea passes through this port, the value of that commodity shipped having been, in 1863, 2,126,286*l.*; in 1864, 1,065,644*l.*; and in 1865, 1,902,607*l.*

Hankow is the farthest limit of foreign trade in the interior of China. It lies at the mouth of the river Han, a tributary of the Yangtse from the north, and forms the depôt of the trade of the Hupeh province. Hankow is, properly speaking, a suburb of the prefectural city of Hanyang, which lies on the opposite side of the river Han; but from time immemorial it seems to have been celebrated as a place of great trade, the scene of a continual fair. This is not to be wondered at, as it lies in the immediate neighbourhood of the central city of China—Wuchang, whither traders from all the richest producing districts in the empire continually flock, and where there is always a congregation of merchants not only from every corner of China, but from Thibet and the provinces of Independent Tartary. Of so vast importance is its possession considered, that it changed hands no less than four times during the period 1853 to 1860, when the Taiping rebels held a somewhat divided sway over the adjacent provinces. The staple import of Hankow is tea; but, as it is the meeting-place of traders from all parts of the interior, every description of import finds a ready market.

The Upper Yang-tse alters so rapidly in all its essential features that a chart, unless constantly under correction, rapidly becomes useless. This is the strongest argument in favour of a regularly organised system of surveying, in which the small war vessels belonging to foreign powers might advantageously co-operate with the Chinese steamers which it is to be hoped will sooner or later be devoted to the conservancy of the river. It will, however, first be necessary to induce the native authorities either to place a steamer altogether at the disposal of the officer appointed to the charge of the navigable portion of the Yang-tse, or to afford him such facilities for the discharge of his duties as may enable him to make at least quarterly corrections in the charts. The difficulties of obtaining such a concession have been over-rated, for the Chinese as a rule are open to persuasion, and require but to be convinced of the necessity of a measure, or of the determination of Western Powers to enforce it. To the Consular representatives, therefore, we must look for aid in this matter, as suggestions coming from foreigners in native employ are likely to be over-ruled whenever such suggestions imply the necessity for increased outlay.

The startling alterations noted below furnish the most unanswerable proof of the necessity for such a succession of surveys as is recommended, for although all the errors at present noticeable in the charts are rectified, these rectifications will no longer be safe guides after the lapse of six months or a year.

Lower Yangtse.—Saddle Islands to Wrecks of ‘Hellespont,’ and ‘Ocean Mail.’—This portion of the river was surveyed in 1864 by Mr. E. Wilds, Master Commanding Her Britannic Majesty’s surveying ship *Swallow*; and the chart constructed on that basis is still sufficiently correct. It is to be wished that Mr. Wild’s survey had been completed as far as Wusung, but other duties, and the approach of the hot season, prevented the fulfilment of the original design, and deprived the mercantile community in China of what would have proved a most valuable boon.

Upper Yangtse.—Wusung to Langshan Crossing.—Of this there is a manuscript chart constructed by the officers of Her Majesty’s ships *Actæon* and *Dove*, during April 1859, and March and April 1861. As far as Centaur Bank

there is no perceptible alteration to be noted, but from this point the indications of the chart are less worthy of confidence. The north-east end of this shoal is rapidly disappearing, while a corresponding increase is noticeable at the north-west end. Passing on to Plover Point we find little or no alteration, but the growth of the north bank towards the southward has modified the condition of the river opposite Southey Knoll, so that the North Bank Buoy, placed close to the edge of the North Bank, now lies w.n. $\frac{3}{4}$ n. from Plover Point, at a spot where at the time of the construction of the manuscript chart there was 8 fathoms, and which lay exactly in the fairway of vessels going up and down the river.

In the manuscript chart 8 to 9 fathoms are shown to the southward of Hunter and Southey knolls. Now, however, the knolls having shifted close to the south shore, deep water covers their former position, while the southward of that position has been transformed into a network of shoals.

About 4 miles higher up, in the position marked "Shoal-water with several dry patches," in May, 1866, 4 to 5 fathoms were found; the same depth being found close to the north shore under the town of Langshan, which in the chart is represented as a continuation of the shoals just mentioned.

Langshan to Chin-Kiang.—Reverting to the chart of 1842, about 11 miles above the former position of the North Tree, which may now be recognised by a broad creek 4 miles above Langshan Pagoda, we arrive at Couper Bank, a growing shoal, dry at low water, outside Green Island. Abreast of this, and on the south bank of the channel, the disconnected shoals laid down in the chart have been replaced by a line of islands with deep water close to. From the western extremity of these islands the course is w.s.w. for $4\frac{1}{2}$ miles, until arrival between two mud-banks recently formed on either side of the channel upon the edges of the shoal marked in the chart.

Starling Island.—Immediately abreast of Starling Island the shoals on the north side have disappeared, and there are now from 7 to 8 fathoms, where, in 1842, there were banks dry at low water.

Opposite Starling Island, to the northward and westward, the shoal marked has become an island, now known as Fishbourne Island, and the channel between it and Starling Island having become impassable, it is probable that before long the two will unite. Close to the north shore, and abreast of the northern extremity of Fishbourne Island, the shoals have washed away, and there are now 6 fathoms immediately under the bank.

Shayaou River.—*Bouncer, or Pottinger, Island.*—This cut-off is now completely closed.

The river is here laid down incorrectly, the course steered to pass to the eastward cutting off a large segment at the south-eastern extremity of the island as laid down in the chart. The channel, as indicated, is closed by a mud-bank at the northern extremity of Pottinger Island, but to the westward of the island there is a second channel carrying 8 fathoms throughout. To this there is a good leading mark in the shape of a large tree on the north bank, opposite the northern extremity of the channel. Close by this tree, on the beach, lies the wreck of the steamer *Surprise*.

Opposite the Hsien-yi-mew Creek, on the south shore, the bank has grown to a very considerable extent, seriously narrowing the channel, and thus compelling vessels to keep under the north shore where the water continues deep.

The same remark applies to that portion opposite the Chang-seng Island, where the south bank has in like manner advanced into the stream.

Immediately above this is the Seausha Island, formerly 3 miles in length, but now disappearing so rapidly that in all probability within a year no trace of it will remain.

Chin-Kiang to Nanking.—Immediately above the foreign concession at Chin-Kiang-fu, upon the south bank, is a canal, or, more correctly, an enormous

dock, recently dug by order of Li-Hung-Chang, Acting-Governor-General of the two Kiang provinces. The design of this step was to draw the native traders from the left to the right bank, which latter had been deserted at the time of the rebel occupation, and had not regained its former prosperity after the extinction of the Taipings. A proclamation has been issued ordering native vessels laden with produce, salt only excepted, to anchor within this dock, or on the southern side of the river, while the merchants have received corresponding instructions to return to their old haunts in the city and suburbs. Much discontent has been caused by this regulation, and various efforts have been made to obtain a modification of the more important of its requirements. Hitherto, however, although some individuals have succeeded in evading it, it has nominally remained in full force, and there appears to be no probability of its being repealed, at least during the present Governor-General's term of office.

The bank on the north shore, abreast of the eastern extremity of Pih-sin-chau, has grown to a very considerable extent, and narrowed the entrance to the north channel. During the winter months the least water in this channel is 12 feet, and in consequence the south channel is used by all steamers of large draught; native boats, however, frequenting the northern cut-off at all seasons of the year. The bank to the southward and westward of Pih-sin-chau has extended as far as the 10-fathom sounding in the chart of 1842. Between the western extremity of Pih-sin-chau and the entrance of Eching Creek, a semi-elliptical shoal has formed, extending at its widest part to the 6-fathom sounding. This has also had a material effect upon the channel to the north of the island.

Abreast of the hills, 7 miles above Eching, and almost exactly in mid-channel, is a rocky ledge not marked in the chart, but lying longitudinally between the 26 and 12-fathom soundings.

Proceeding up the river to the great bend at the Tsaou-hea Island, the water has deepened considerably under the north bank, while the island itself has grown out upon its northern and north-eastern shores. The bight abreast of Ping-shan Pagoda has filled up, and the edge of the shoal now lies along the 3-fathom line as laid down in the chart. It is to be noted that the cut-off known as Nanking Creek, has, by a recent regulation, been closed to foreign vessels, and is now used only by native junks and steamers flying Chinese flags.

Nanking to Wu-Hu.—We now take the chart of 1858, constructed by Commander Ward and the officers of the *Actæon* and *Dove*. Abreast of the San-shan, the left bank has shoaled to nearly mid channel, but immediately above this place the bank has cut away, and deep water is found close in. Off the three islands placed on the right bank below the entrance to May Queen Channel the water has become very shallow to a point nearly half way across the river.

Rosina Rock.—On the left bank, at the entrance of the May Queen Channel, a rock, known as the Rosina Rock, lies at a distance of 200 feet from the bank. The May Queen Channel itself is closing rapidly, and has of late been deserted by foreign vessels. The southern extremity of the island immediately below Wade Island has extended about a mile in a s.s.w. direction, thus seriously narrowing the channel between the islands. The southern extremity of Wade Island has in like manner extended for nearly three-quarters of a mile, and the left bank, a little way above it, has shoaled for about 2 miles. Dearborne Island, abreast of Point Morton, has grown about three-quarters of a mile to the southward, and the left bank, from a point abreast of the island to the fort, is very shallow.

Rocky Ledge.—About a mile and a quarter below Wu-Hu, a rocky ledge has been discovered close to the right bank.

Wu-Hu to Hen Point.—Immediately abreast of the Wu-Hu pagoda the

water sets in strong eddies, necessitating the greatest care on the part of pilots, especially at night. Indeed the river between Wu-Hu and Lang-Kiang-Ki (Hen Point), both from the strength of the current and the intricacy of the navigation, presents very considerable difficulties and offers the strongest argument in favour of careful periodical surveys. The left bank of Wu-Hu Reach has shallowed, but the islands noted in the chart as "dry in December" have disappeared. About a mile and a half above Su-Kiang is a small rocky island under the right bank, and from this to the San-Shan-Ho the water along that bank has deepened. The northern and eastern sides of Haines Point have extended to mid-channel, at the expense of the opposite shore, which has been cut away and deepened to 15 fathoms. On rounding the Point the left bank will be found to have shoaled for about 400 yards; but the right bank gives deep water close to, as far as Yangkeatsun. The land about Barker Island is incorrectly laid down, the island extending much further to the northward than appears on the chart. Off Kieu-hien, on the shoal marked $2\frac{1}{2}$ fathoms, there are now 7 fathoms, and at the point abreast of the upper extremity of Barker Island the shoal marked has completely disappeared, and 3 fathoms may be found close to the bank. Off Leynliu, opposite Teih-Kiang, the bank has shoaled to a slight degree. From Osborn Reach to Wild Boar Reach the chart is incorrect, the southern channel curving considerably more to the northward than is laid down. In the middle of the southern channel there is an island, to the westward of which lies the course adopted by steamers. Neither the southern nor middle channels, the latter of which is known as Cosmopolite Channel, can be used except after the water has risen 12 feet. In June, 1863, the soundings in the former ranged from 3 to 7 fathoms, and in the latter from 4 to 8.

A third channel to the north of Cosmopolite Channel is that principally used, and to it we confine our attention. The mud-bank on the left shore of Osborn Reach, marked "dry in December," has extended to the southward and westward, while the land above it on the same side, in the neighbourhood of Lauwan, has washed away. On the right bank opposite the Siau-shan-miau village the land has extended a considerable distance into the stream, the channel, however, remaining unaltered. Opposite the western entrance of Cosmopolite Creek, and above a conspicuous tree growing on the left bank, a shoal of no very considerable extent has formed. We note no alterations of importance until we reach Ta-tung, opposite which, on the left bank, a shoal has formed extending to the 5-fathom sounding, as marked in the chart of 1858, while above Ta-tung, abreast of Wu-pa-kau, another shoal has grown on the spot marked "shallow." Arriving at FitzRoy Island, the direct channel is closed at the upper end, and the northern channel is now exclusively used. From the eastern end of the island a most dangerous shoal extends to a distance of nearly a mile; soundings in May, 1866, showing a depth of no more than 4 feet. As this shoal was not seen during the winter of 1865-66, when the water was at least 16 feet lower than in the month of May, we must conclude that it was suddenly formed. The shoal on the left bank, abreast of the upper extremity of FitzRoy Island, has disappeared, and at the place indicated in the chart as shoal there are now 3 fathoms. The river in the neighbourhood of Hen Point is excessively dangerous, principally from the existence of rocks lying abreast of it, and of a spit just above a low point not marked in the chart, but nearly opposite Lang-kyang-ki. In order to avoid this spit, which extends to the 7-fathom mark, vessels on arriving close to the low point mentioned above steer south-east to the opposite side of the river, where there is deep water close to.

Hen Point to Tung-Liu.—The junk channel to the north of Jocelyn Island may be used during the winter, the least water at that season being 15 feet. Abreast of Nean-king the bank marked in the chart as dry has not been seen of late; but I am not in a position to state whether or not it has entirely dis-

appeared. The spit off Sandy Point must be approached with much caution, as it is fast increasing in an easterly direction. To the eastward of Christmas Island the Junk Channel has shoaled, while the spit at the southern entrance is rapidly enlarging, an island having formed about a mile to the southward of Red Sand Bluff. From this point to about a mile above Tung-liu the western or left bank is shallow, but may be approached with safety in summer.

Tung-Liu to Split Hill.—The bank above Tung-Liu, marked "dry in December," has extended slightly at both extremities. Immediately above it, and in a direct line with it, is a ledge of rocks, upon which the steamers *Sze-chuen* and *Express* grounded in February, 1865, at which date there were 4 feet of water over it. To clear this ledge in winter the course lies within 150 feet of the right bank; but too much caution cannot be observed, as rocks are found close in-shore about 2 miles farther up. The left bank has grown into a semi-elliptical shoal from Whan-yuen-chin to Dove Point, but the Point itself is steep. The channel to the eastward and southward of the island off Dove Point is now known as Ma-tong Cut-off, and may be used in summer, but is considered extremely unsafe. Abreast of Dove Point, on the opposite side of Bullock Reach, a bank has formed, which narrows the channel to a considerable extent; and on the western side of the Reach the sandbank has much increased, thus compelling vessels to keep the left shore well on board from Dove Point to the Little Orphan. Rounding the Reach above the Little Orphan, where in the chart 8 fathoms is marked, a spit has extended from the "low sandy shore" on the left bank; and the channel, therefore, lies close to the right shore above three conspicuous hills which come down to the water's edge. A mile above Remark Rock a wide creek opens on the right shore, leading towards the low hills marked "80 feet." About n.w. by w. from this creek, on the opposite bank, is a point, close to which the channel lies. The sandbank on the right shore has extended half-way across the river for the distance of about 6 miles, and above it the sandbank has been replaced by well-marked land. The channel to the north of the shoal, marked "dry in December," has been closed by the continuation of the shoals towards north-east and south-west from the earth bank to Point Beecher. This shoal is cleared by pursuing a course north-east and south-west from a large tree on the left bank in a conspicuous position below the shoal. The least water found in winter in the channel thus indicated is 18 feet. Off Oliphant Point an island has formed which narrows the entrance to the northern channel. In February, 1864, the depth of water on the bar in the northern channel was 12 feet, and in the southern 8 feet. Immediately above Kiu-kiang the left bank of Seymour Reach, as far as Hunter Island, and a considerable portion of the right bank have shoaled to such an extent as to reduce the width of the channel to a minimum. Arriving at Hunter Island, the southern channel is closed in winter, and on the bar in the northern channel no more than 12 feet water is found. In summer both are passable. When approaching the village of Fu-tse-kan the channel is found to have narrowed considerably by the increase of the banks on both sides.

Split Hill to Wu-chang-hsien.—Abreast of Havoc Rocks, in mid-channel, a rock, 3 feet above water, was noticed in February, 1865. The right bank of the river abreast of Kichau, from the hill close to the water's edge, marked "150 feet," to a point abreast of hills a mile inshore, marked 200 feet, has shoaled to an alarming extent, making the channel dangerously narrow during the winter months. The right bank below Kitau has grown to the "5-fathom" sounding, and above Lee Rock, on the left bank, the shoal has extended slightly beyond the same sounding; thus rendering the utmost care and circumspection necessary while passing both bends. From 300 to 500 feet from the left shore immediately above Whuy-lung-ki Hill, a very dangerous ledge of rocks, not marked on the chart, is to be found. The Pa-Ho Reach, above Collinson's Island, is full of shifting shoals, which it would be

vain to attempt to describe, as their relative positions with regard to one another and to the banks of the river change with the utmost rapidity. The sole guide, therefore, is experience, which can only be gained either at the expense of continual trips up and down, or from the observations of the captains of the steamers that constantly navigate the river between Wusung and Hankow.

Wu-chang-hsien to Hankow.—The channel to the westward of Gravener Island is filling up, and must be considered unsafe. The bank above the island, marked “dry in winter,” is now well-marked land. On the right bank, nearly abreast of a clump of trees a little above Sang-kiang-kan, a new channel has opened,—not, however, yet surveyed. Its direction is N.W. by W. In the Lo-koh-hi Reach, of Yang-kia-chan, a shoal has extended from the left bank to the 6-fathom sounding; and immediately above this a bank has risen in mid-stream, where in the chart 6 and 7 fathoms are given. As the right bank in the neighbourhood is rocky, the channel adopted lies to the north of the new bank.

Off Lo-koh-ki, and abreast of the bluff, a ledge of rocks has been discovered, about 500 feet from the right bank; and on the opposite side the “sand-bank” has grown to the southward and eastward as far as the 4-fathom mark. After passing Pi-hu-shan, or White Tiger Hill, the right bank of the Yang-lo Reach has extended for a considerable distance; but upon passing the first hill, marked “200 feet,” a course N. $\frac{1}{2}$ W. for the ruined temple on the left bank escapes the danger. In Pakington Reach, between Sha-kan and the creek above it, the left bank has shoaled to a distance of about half-a-mile. Thence to Hankow the extensive shoals which have formed on the right bank render it necessary to keep the left bank well on board.

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PROCEEDINGS
OF THE
ROYAL GEOGRAPHICAL SOCIETY.



VOL. XII.
SESSION 1867-8.
Nos. I. to V.

EDITED BY THE ASSISTANT SECRETARY.

Authors are alone responsible for the contents of their respective statements.

LONDON:
15, WHITEHALL PLACE,
1868.

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N.B.—Home and Foreign Literary and Scientific Societies whose publications are exchanged with those of the Royal Geographical Society, are requested to note the following abstract of the Regulations of the General Post Office with reference to matter sent by Book Post :—

Every packet must be sent either without a cover, or in a cover open at the ends, so as to admit of the enclosures being removed for examination. For the greater security, however, of the contents, the packet may be tied *across* with string, but must not be sealed, and should have the words "Book Post" marked in legible characters above the address, in all cases in which there is a postal arrangement for the transmission of printed matter between the two countries at reduced rates.

It is also particularly requested that all MSS. intended for publication in the Society's Transactions be written only on one side, for the convenience of printing.



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ELECTED 25TH MAY, 1868.

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PROCEEDINGS
OF
THE ROYAL GEOGRAPHICAL SOCIETY.

[ISSUED JANUARY 18TH, 1868.]

SESSION 1867-68.

First Meeting, 11th Nov., 1867.

SIR RODERICK I. MURCHISON, BART., K.C.B., PRESIDENT, in
the Chair.

ELECTIONS.—*His Imperial Highness Ismail Pacha, Viceroy of Egypt*, was elected an Honorary Member of the Society. *Rev. Andrew A. W. Drew, M.A.*; *W. Herbert Evans, Esq.*; *Sir Henry Bartle E. Frere, K.C.B.*, and *Rev. John Graves*, were elected Fellows.

ACCESSIONS TO THE LIBRARY SINCE THE LAST MEETING, JUNE 22ND.—
‘*Jobi Ludolfi Historia Ethiopia succincta descriptio regni Habesinorum quod vulgo malé Presbyteri Johannis vocatur.*’ Frankfurt, 1861, folio. Purchased. ‘*Ad hac editionem Commentarius,*’ 1691. Purchased. ‘*A New History of Ethiopia,*’ in four books, by Job Ludolfus, 1864. Purchased. ‘*Wanderings among the Falashas in Abyssinia, with Description of the Country and its various Inhabitants;*’ maps and plates; by Henry A. Stern, 1862. 8vo. Purchased. ‘*Routes in Abyssinia,*’ with two Appendices. Topographical Department of the War Office, 1867. Presented. ‘*The British Captives in Abyssinia,*’ by Charles Beke, 1867. Purchased. ‘*Voyage en Abyssinie dans le Province de Tigré, du Samen, et de l’Amara,*’ by MM. Ferret and Galinier. 3 vols., with maps and plates, complete, 1839-47. Purchased. ‘*Captives in Abyssinia*’ :—Parliamentary Reports, 1866. Purchased. ‘*Voyage en Abyssinie, exécuté pendant les années 1839-45, par une commission scientifique composée de MM. Lefebvre, Petit, Dillon et Vignaud;*’ complete. Purchased. ‘*A Journey through Abyssinia.*’ Henry Dufton, 1867. Purchased. ‘*The Nile Tributaries of Abyssinia, and the Sword*

Hunters of the Hamram Arabs,' by Sir Samuel Baker. Presented by the Author. 'Medical Report on the Kingdom of Shoa.' 'Reise nach Abessinien, den Gala-Ländern Ost Sudan und Chartum, in der Jahren 1861-1862,' Th. von Heuglin. Illustrations and map. Presented by the Author. 'Die Sprache der Bari in Central-Afrika.' J. C. Mitterrutzner. Purchased. 'De un viaggio sul fiume Biancanell' Africa Centrale.' Don G. Beltrame, 1864. Presented by the Italian Geographical Society. 'Die Mande-Neger-Sprachen.' Dr. H. Steinthal, Berlin, 1867. Purchased. 'Der Nil: seine Quellen,' von Dr. T. Kotschy. Presented by the Author. 'Sheep and Stock Farming, South African and Transvaal Republic,' &c. Mr. Blake. 'Atlas du Voyage au Congo et dans l'Afrique Equinoxiale,' par J. B. Donville. Presented by W. D. Cooley, Esq. 'Sud-Afrika und Madagascar:' Justus Perthes' Mittheilungen. Gotha, 1867. Petermann. 'Tamatave to the Capital (Madagascar).' T. Wilkinson. Presented by the Author. 'Neueste Deutsche Forschungen in Sud-Afrika,' von Karl Mauch, H. Hahn, und R. Brenner, mit Karte, 1867. Presented by Dr. Petermann. 'The Company and the Crown, 1867. Hon. J. H. Thurlow. Presented by the Author. 'The Bombay Builder.' J. Tennent, Esq. 'A Journey by Captain Ross along the Mekran Coast between Cape Jask and Gwadar,' 1867; map. Presented by the Commissioner of Sindh. 'Lusiad of Camoens, Dissertation on the Discovery of India.' Presented by S. M. Drach. 'Hugonis Grotii, Batavicae,' 1632. Purchased. 'P. Gyllii, de Constantinopleos Topografia,' 1632. 'L'Ambassade de la Compagnie Orientale des Provinces Unies vers le Grand Cham de Tartarie.' Leyden, 1665. Presented by Sir W. Parish. 'On Tea Cultivation in Eastern Bengal,' 1867. W. N. Lees. Presented. 'Bibliographia Palestinæ,' Titus Jobler. Leipsic, 1867. Purchased. 'Notes of a Journey through Egypt and Palestine by Mediterranean and Italy, by a Lady.' Presented by S. M. Drach, Esq. 'Reise in Siam in 1863.' 3rd vol. Dr. Adolf Bastian. Presented by the Author. 'British Guiana,' Paris Exhibition Catalogue. Presented by W. Walker, Esq. 'Barrow's Collection of Voyages,' 1745. Presented by S. M. Drach, Esq. 'Geographia Generalis.' B. Varenius, 1671. 'System of Universal Geography,' 1864. F. Muir. Presented by the President. 'Kurzer Abrige der Geographie Halle,' 1794. Presented by S. M. Drach, Esq. 'On Education of Youth in History and Geography.' J. Clarke, 1736. Presented by S. M. Drach, Esq. 'Compendium Geographicum,' by Golnitz, 1634. Purchased. 'Venezuela; or, the History, Climate, Soil, &c., New Granada, Ecuador,' 1867. 'Report on Interoceanic Canals and Railways between Atlantic and Pacific Oceans.' Maps. Presented by

Admiral Davis, United States. 'Exploracion Oficial, desde el norte de la America del sur, Orinoco, Cassiquiare, Rio Negro, Guyana,' &c. Maps. F. Michelena y Rojas, 1867. Presented by the Author. Charles Sumner, 'On the Cession of Russian America to the United States,' 1867. Presented by J. E. Nourse, United States. 'List of reported Dangers in the Pacific Ocean not recorded in Maps in general use,' 1866. The United States' Navy Hydrographical Department. 'The Republic of Mexico Restored.' M. G. Garzia, Mexico, 1866. Presented by the Author. 'United States' Naval Astronomical Expedition,' vols. 3 and 6, by J. M. Gillis, 1856. Presented by Sir W. Parish. 'On Crania, West Pacific.' J. B. Davis. Presented by Dr. Lamprey. 'L'Exposition Ethnographique, Paris, 1867.' 'Results of Meteorogical Observations for 25 years at Hobart Town,' by F. Abbot. 'Suecia.' 'Hispania.' 'Portugallia.' 3 vols., Elzevir editions, 1631. Purchased. 'Residence in Normandy:' Constable's Miscellany, 1831. Presented by S. M. Drach, Esq. 'Adventures in North of Europe,' by Edward W. Landor, 1836. Presented by S. M. Drach, Esq. 'L'Ile de Crète,' par V. Raulin, Paris, 1867. Purchased. 'Bosnien,' by G. Theommel, Wien, 1867. Purchased. 'Les Travaux d'Amélioration aux Embouchures du Danube;' Galatz, 1867: 'Embouchure de Soulina,' 1867, Leipsic. Presented by the Secretary of State for Foreign Affairs. 'Tea-trade of Russia.' Mr. Lumley, 1867. Presented by the Foreign Office. 'Russia, Moscovia itemque Tartaria,' 1630. 'Den Danske Gradmaaling,' 1867. C. G. Andrée. The Publisher, 'Veröfentlichen Resultate der Recrutirung Geschafte.' Th. Bischoff. 'Navigation Française et la Révolution Maritime du 14 au 15 Siècle, etc., 1867,' par P. Margry. Purchased. 'Army of Great Britain, 1867.' Presented by Sir H. James. 'Frobisher's Three Voyages.' Hakluyt Society. 'Grönland und die Grönlander.' Dr. Helmes. 'Distribution of Temperature in Lower Regions of Earth's Atmosphere.' H. Hennesy, F.R.S. Presented by the President. 'Siluria; a History of the Oldest Rocks in the British Isles,' &c., by Sir Roderick I. Murchison. Presented by the Author. 'Darmstadt Geologische Spezialkarte des Grossherzogthums Hessen.' Maps, plates. 5 vols. 'Notes et Documents sur les Tremblements de Terre, et les Phénomènes Volcaniques des Iles d'Aleutiennes et de la côte Nord Amérique.' 3 vols. Paris. Presented by the Author. 'Coup d'œil général sur le Topographie et la Géologie du Mexique et l'Amérique Centrale,' par M. d'Aoust. Presented by the Author. 'Nivellement de Précision de la Suisse.' A. Hirsch and E. Plantamour, Genève, 1867. Presented by the Foreign Office. Dr. S. G. Blanc's 'Wissenswürdigkeiten aus der Natur und Geschichte der

Erde,' etc. Presented by Dr. H. Lange. 'Killebuttcl und das Seebad zu Kuxhaven.' Hamburg, 1818. 'Remarks on Korea,' 1865. Allen Young. Presented by the Author.

ACCESSIONS TO THE MAP-ROOM SINCE THE LAST MEETING, JUNE 22ND.—The principal maps are marked thus* :—Tracing of the rivers Endeavour and Annan, in Queensland, Australia. Presented by Sir G. Bowen. Native Map of Japan, divided into provinces, and coloured. Road-map from Pekin to Kiachta. Presented by E. C. Bowra, Esq., Customs, at Canton. *Map of the Colorado Territory, United States. Presented by J. Barwise, Esq. *Map of the Argentine Republic, &c. *Map of the Province of Buenos Ayres, 6 sheets. Both presented by Mr. Burgis. Map of Central America. Presented by E. G. Ravenstein. *Map of the World, and one of Asia Minor, in Turkish characters; constructed and photographed by his Excellency Ahmed Vefyk Effendy. *Map of the International Atlantic and Pacific Junction Railway, Nicaragua, as projected by Capt. Bedford Pim, R.N., 1866. Map of Northern Africa, shewing the routes of Gerhard Rohlfs, in 1861 to 1867. Presented by A. Petermann. *Topographical Plan of the Province of Madrid, on 22 sheets, with index and triangulation. Presented by Don Juan de Vila Nova, Professor of Geography, Madrid. *Map of Nubia and Abyssinia, by A. K. Johnston, F.R.G.S. *Photographic copy of the general Map of the United States' Boundary Survey, on 2 sheets, by D. Williams. Presented by Archibald Campbell, U. S. Commissioner. *Danish Chart of the Kattegat, 1867. *Map of Abyssinia. Presented by J. Wyld, Esq. (2 copies). Map of Abyssinia, shewing the Nile tributaries, by Sir S. Baker. Map of Abyssinia, by Dr. Beke. Both presented by E. Stanford, Esq. *Map of Abyssinia, by the Topographical Dépôt of the War Office. Presented by Sir. H. James, Director. *Map of the Isthmus of Suez, by M. Voisin, Director. Purchased. Map of Nova Zembla. Map of United States of America. Both by A. Petermann. *Map of British Columbia, prepared under the directions of Capt. Parsons, R.E. Presented by the Author. Also a section of the above, and tables of Meteorological Observations. *Admiralty Charts, 36 sheets. *Ordnance Maps, 496 sheets, up to date of publication.

The PRESIDENT opened the Session with the following Address :—
GENTLEMEN,—In opening this Session, the first subject to which I have to allude is the progress of the Searching Boat-expedition which Her Majesty's Government, at the representation of our Council, has sent out in order to obtain authentic tidings of Dr.

Livingstone. As I announced to you in my Anniversary Address, the Boat-party, under the leadership of Mr. Young, and provided by the Admiralty with every requisite, set sail from Plymouth on the 11th of June. At the Cape of Good Hope, Mr. Young received great assistance from the Authorities, obtaining a whale-boat for the carriage of his stores, and the addition of two native Africans to his party; one of whom could speak the Zulu language, and would be most useful as an interpreter when the expedition arrived at the head of Lake Nyassa. Two letters will be read to you, giving details of the progress of the party up to their arrival within the mouth of the Zambesi. Meantime it is satisfactory to learn that they made a very quick voyage from the Cape to the Kongoni entrance of the Zambesi, accomplishing the distance in $9\frac{1}{2}$ days; and, after obtaining a negro crew, departed on the 27th of July upstream on their venturous errand.

I have so often explained to you the cause of my scepticism on the painful subject of the reported death of Livingstone, produced chiefly by my estimate of the mendacious character of the only man who says he witnessed the catastrophe, and also from that person having given two accounts of it—the one entirely contradicting the other, that I am sure you feel with me, it was due to the reputation of our body that we should not attach credence to such a story, and that we should wait until some valid proof of the death of my illustrious friend had been obtained. I therefore repeat what I said when the expedition left our shores, that we must abide patiently till the second—perhaps the third—month of the coming year, when Mr. Young's party, having returned from the upper end of Lake Nyassa, shall have set our painful suspense at rest. If we should then happily learn that Livingstone was not killed at the spot mentioned, but had passed on into the interior, why then, if accompanied by a few black men only (which was the case when he carried out successfully all his earliest great discoveries), I have such faith in his unyielding energy and never-failing resources—that, though he may have had no means of communicating with the coast, he may, after an interval of a year or more, reappear and rejoice us with an account of his northward exploration along, and perhaps far beyond, the Lake Tanganyika.

In regard to the geography of Abyssinia, to the consideration of which public attention is re-awakened, there will be read to you this evening a condensed sketch of the expeditions to that country, in the fifteenth, sixteenth, and seventeenth centuries, by our great precursors in bold adventure—the Portuguese, as prepared by our

Secretary, Mr. Clements Markham. On this subject, permit me to remind you that twenty-four years have elapsed since—when occupying this Chair—I brought before the Society as much knowledge respecting Abyssinia as it was in my power to collect; basing it, naturally, on the then recent researches of our associate Dr. Beke, which justly gained for him a wide reputation and our Gold Medal.

After mentioning the names and exploits of forty-two travellers who had been in Abyssinia in the forty years preceding the year 1844, I stated that of all those who, since the days of Bruce, had visited that country, Dr. Beke was then the individual who had most improved our geographical acquaintance with it. Since that time it has been the good fortune of our Society to boast of another most successful explorer of Abyssinia in the person of our associate Mr. Mansfield Parkyns; and, after the very trying difficulties which he surmounted, and the remarkable events he witnessed, no one can any longer see reason to doubt the truthfulness of any of the descriptions by Bruce. In fact, all foreign travellers who have visited Abyssinia, whether the brothers D'Abbadie, or their successors, MM. Ferret et Galinier, MM. Combes et Tamissier, or M. Th. von Heuglin, who has just issued the narrative of his journeys in 1861 and 1862, confirm the earliest impressions we received from our countryman Bruce respecting this extraordinary region.

During the vacation which has passed, I invited the attention of Her Majesty's Government to the desirability of sending out some men of science with the military forces about to proceed to Abyssinia, in order to procure more accurate knowledge respecting the geography, geology, and natural history of the interior of that country than we now possess; and I ventured to hope that, although in the great expedition to Turkey and the Crimea, a similar suggestion, which was then made, met with no attention, it would not be overlooked on this occasion. I am happy to say that the suggestion was approved of by Lord Stanley and Sir Stafford Northcote, the Ministers under whom the expedition originated. Whilst it has been thought best by Her Majesty's Government to take the greater number of such men of science from Bombay, the Secretary for India has been pleased to approve my special recommendation that our Secretary, Mr. Clements Markham, should proceed from hence to act as the Geographer of the Expedition. Although we shall have to regret the absence of Mr. Markham during this session, I am confident that you will agree with me that he could not possibly be better employed in advancing our science than by taking part in this interesting mission; and, judging from his antecedents in South America and British India, we may confidently reckon upon him as

a correspondent who will give us a masterly geographical sketch and a vivid description of the region he may traverse.

I may also mention that Mr. W. Blanford, the Deputy Superintendent of the Geological Survey of India, who has been named to accompany the expedition from Bombay, is as sound and clear-sighted a practical geologist as could have been found at home; for he was educated in the Royal School of Mines, and has since produced excellent memoirs on parts of the Himalaya Mountains and Western and Central India.

Lieutenant St. John, one of our Fellows, who has already given us good information respecting Persia, has laid before us a memoir, which will be read at an early meeting, on the elevation of the country between Teheran and Bushire. This able officer, who has been employed in establishing the new line of electric telegraph in Persia, is, I am happy to hear, to be one of those who will accompany the Abyssinian expedition.

It is also gratifying to reflect upon the fact that, on this occasion, the Government has made every endeavour to bring together all procurable data respecting the various practicable routes across the country—a task which has been most efficiently completed by Lieutenant-Colonel Cooke, R.E., of the Topographical Department, under the direction of Sir H. James; each route of the numerous travellers being laid down in the first instance on Keith Johnston's new map. This has been followed by the completion of a new map of a large tract of Abyssinia, the result of an assiduous sifting and comparison of all previous documents, combined with hitherto unpublished materials. In the mean time, and in expectation of valuable additions which will be made, the public has now the advantage of consulting the general maps of Abyssinia, issued by our associates Mr. Keith Johnston and Mr. Wyld; and also two detailed maps, just received from our assiduous foreign contributor, M. Petermann, one of which exhibits, on a large scale, the features of the country between Massowah and Halai, in which the first operations of the British army will take place.

At the last meeting of the British Association, held at Dundee, the reputation of the Geographical and Ethnological Section was well sustained by the eloquent address of the President, Sir Samuel Baker. The very attractive volume which he has since published, entitled 'The Nile Tributaries of Abyssinia,' will, I venture to anticipate, have a reception from the public which will go far to rival that of his previous great work, narrating the discovery of Lake Albert Nyanza; for many readers will prefer his lively description

of the picturesque and bold Arab hunters, and the diversities of the wild animals of their country, to the journal of any wanderings among the inferior negro races on either side of the equator. The important observations of Sir Samuel, which shew that the true agricultural wealth of Lower Egypt is due to the fertile mud brought down by the Atbara and the Blue Nile with its affluents, as contrasted with the effects of the grander drainage-system of the White Nile, accords exactly with that which the geographer and geologist might expect who compares the physical outline and structure of the two regions in question. All the equatorial countries through which the White Nile flows, as well as those in which its great internal feeders or water-basins lie, are made up of hard, crystalline, and sandstone rocks, with scarcely the trace of lime, and few or no volcanic rocks; Abyssinia, on the contrary, and particularly all its western portions from which the Atbara and the Blue Nile flow, is made up of rocks containing a great variety of mineral substances, to a great extent of volcanic origin, which decompose into rich and valuable mould.

Then, again, we know that these mud-bearing affluents of the Nile descend in comparatively short courses and with great rapidity from the mountains of Abyssinia, which are very much loftier than the very distant plateau-lands in which the great and distant feeders of the White Nile lie; and in these data we see abundant reasons, whether geographical or geological, to sustain the view adopted by Sir Samuel Baker.

Among the papers which have been received at our office, and will be read to you at the earlier Meetings of the Session, I may observe that some of the most important, in a geographical point of view, relate to different portions of the Isthmus of Central America, and to surveys which have had for their object the discovery of lines of traverse, whether for railways or ship-canals, between the Atlantic and Pacific Oceans. One of these papers is by Mr. Collinson, a young engineer employed in the exploration of a line of route across the wildest parts of Nicaragua, in which he was engaged under the direction of Captain Bedford Pim, R.N., and which may be expected to throw much light on the physical geography of that region. On this subject, but more particularly relating to the winds and currents of the sea-coasts of Nicaragua, an interesting paper was read by Captain Maury before the Geographical Section of the British Association at Dundee; and I may venture to hope that this distinguished hydrographer will communicate to us a memoir on the same subject in the course of the Session.

Another memoir by M. de Puydt on that portion of the Isthmus of Darien which lies about 60 miles to the southward of the tract reported upon, some sixteen years ago, by Mr. Gisborne, will doubtless excite much interest, particularly as the author shows that the dividing ridge between the Atlantic and Pacific Oceans there attains a maximum of only 120 feet above the sea-level.

We also hope to be soon favoured by Mr. Whympers with an account of the excursion which he has made to Greenland, and from whence he has just returned, having arrived at Copenhagen in a Danish vessel on the 22nd of last month. His projected sledge-journey into the interior of that glacier-covered land has been rendered less extensive than he had hoped, by obstacles which it was impossible to foresee; the chief of which was an epidemic, which has carried off from 8 to 10 per cent. of the population. The secondary objects of the expedition, however, as will be related to you, have been effectively carried out, and large collections have been made of the fossil and recent plants of the country, the marine animals of its shores, and stone and flint implements of its former inhabitants. It gives me much pleasure to announce that the British Association for the Advancement of Science have voted the sum of 100*l.* to Mr. Whympers to support his bold adventure, undertaken originally entirely at his own cost, and in the hope of throwing fresh light upon our knowledge of the present vegetation and animal life in the interior of that snow-clad region, as well as of explaining its former much warmer climate, whence plants, now fossil, which grew in these Arctic latitudes, must have derived for their existence a much greater amount of heat.

Lastly, gentlemen, let me congratulate you on opening this Session with an unusually long list of new candidates for enrolment as Fellows, among whom are many persons of note at home, headed by the noble Duke who now presides over the British Association, and of men highly distinguished in our Colonies led on by Sir Bartle Frere.

It is by such accessions, derived from all classes of our countrymen, that the truly British and cosmopolitan character of our Society is maintained.

The following letters were read, relating to the progress of the Livingstone Search Expedition:—

“DEAR SIR,
“H.M.S. *Petrel*,
“Off the River Kongoni, July 26, 1867.
“I have the honour to report that we sailed from the Cape, in this ship, on the 16th inst., and have had the good fortune to make a very quick passage

(9½ days). I have received every assistance from the senior officer at the Cape, and also from Commander Gordon of this ship. I obtained one whale-boat complete from the dockyard at Simon's Bay; but during the voyage, having had reason to fear a want of carriage for all our stores, Commander Gordon, on my application, has had a second whale-boat prepared to go with me if I required it; and a few additional items of stores and provisions have been supplied me. I have also volunteered two Kroomen and an English stoker from this ship, feeling it advantageous to add to the strength any reliable party. One of the Kroomen, or rather Africans, carried originally from Delagoa Bay, speaks a little Portuguese. The stoker, who is also a seaman, I have taken with a view to putting him in charge of the third boat. In my letter from the Cape, I forgot to mention that I succeeded in finding the two boys whom we liberated from slavery, and brought there in the *Pioneer*; they have willingly joined us, and are likely to be very useful as interpreters.

"On our arrival this morning at the East Luabo, we found the entrance completely changed and quite impassable; so we retraced our steps, and anchored off the Kongoni, where the bar seems fairly smooth. Here also the change is almost marvellous, Pearl Island having almost completely vanished, and the entrance become tortuous. We hoisted out the boat, which has taken much longer to put together than was anticipated (nearly three days); but finding her leaking at some of the joints, we got her in again to remedy the evil, and expect to have it ready to cross the bar at high water to-morrow.

"I have not altered my views respecting the probable time of our return to the mouth of the Zambesi, and have written asking the senior officer at the Cape for a ship to meet us on the 1st December.

"In conclusion, I am happy to say that, as far as I can judge, we are supplied with everything we can need, are all in the enjoyment of perfect health, and look forward confidently to a successful accomplishment of our undertaking.

"I have the honour to be, sir, your most obedient servant,

"E. D. YOUNG,

"In command of Livingstone Search Expedition."

"To Sir R. I. Murchison, Bart."

"H.M.S. *Petrel*,

"SIR,

"Simon's Bay, 15th August, 1867.

"I HAVE the honour to report that, in pursuance of your orders, I left Simon's Bay on the night of the 16th July, with Mr. Young and party. I carried a strong fair wind till midnight on the 18th July, when I had to raise steam for an hour or two, to communicate with Algoa Bay.

"Receiving no news of importance, I immediately proceeded, keeping the same fair wind, which increased to a strong gale, till past Natal, on July 21st. From this time I experienced light winds and calms, and I had to steam the remaining 600 or 700 miles. I anchored off the Kongoni mouth of the Zambesi at midnight on the 25th July, having made the passage, including the stoppage at Algoa Bay, in 9 days and 3 hours.

"Next morning Mr. Young being unable to recognise the place, I steamed for some 20 miles to the eastward, seeking either the Luabo or Kongoni entrance. I finally returned to my first position, which was indeed just off the the Kongoni mouth, though Mr. Young had failed to recognise it, from the alterations that had taken place—Pearl Island having been completely washed away. Great changes had also taken place in the other entrance; the East Luabo appearing quite impracticable. On the passage up, on Mr. Young's requisition, I furnished him with our whale-boat, in addition to the one from the dockyard, and a few other miscellaneous stores. I also allowed my two

Kroomen (who it appears are natives of this part of the coast), and on his written requisition a stoker, named Arthur Stacey, to accompany him as volunteers, checking them on the ship's books as lent to the Expedition. On anchoring the second time off the Kongoni mouth, the steel boat which we had been employed in putting together during the previous three days, was hoisted out, but was found to leak so considerably that we had her lifted in again immediately to remedy the defect. The tide did not serve for crossing the bar till the next forenoon, by which time we had reconnoitred the entrance, and had all the boats, including the two cutters, loaded and ready to go in over the bar, in charge of Mr. Berners, the senior lieutenant. They all passed safely in, being directed by myself at the masthead with pre-arranged signals. In the afternoon Mr. Berners returned with the two cutters and the extra crews who had taken the boats in, and reported that Mr. Young having, with unexpected good fortune, met some natives at the point, who agreed to man his boats, required no further assistance from us. On the same evening, 27th July, I started on my return, using a very little steam to gain an offing—wind, swell, and current all setting on shore.

“Commander GORDON.”

“To Commodore Henry Caldwell, C.B.”

The following paper was read :—

On the Early Portuguese Expeditions to Abyssinia.* By CLEMENTS R. MARKHAM, Esq., Secretary R.G.S.

THE author stated that as soon as the aspirations of Prince Henry of Portugal had been fulfilled by the discovery of the Cape of Good Hope, by Bartholomew Dias, in 1487, King John II. saw the importance of collecting information in the East, with reference to the possibility of turning the rich trade of the Indies into the new channel ; and he was also anxious to discover the dominions of the Christian ruler called Prester John, who had been reported by Marco Polo to reign in the far east. Two Portuguese, named Alfonso de Payva, and Pedro de Covilham, were selected for this service. After a long journey through the East, Payva died at Cairo ; but Covilham, having heard that a Christian ruler reigned in the mountains of Ethiopia, and having gained no tidings of any other Christian king during all his wanderings, naturally concluded that the Ethiopian potentate was he for whom he had so long sought in vain. So, in pursuance of his instructions, and undeterred by the dangers of the journey, he penetrated into Abyssinia, and presented himself at the court of the Negus, which was then in the Southern Province of Shoa, in the year 1490. He delivered the King of Portugal's letter to Prester John to the Negus Alexander ; but he was detained by this prince and his successors, and was never allowed to leave the country. Covilham, as a young man, had distinguished himself both in the war with Spain and in Morocco, and was an officer of capacity and great courage. He married in Abyssinia, obtained great influence at Court, and sur-

vived for many years, for he was still living when the Portuguese embassy arrived in 1520.

In 1507, Ebana Denguel ("Virgin's incense"), or David, ascended the throne of Ethiopia, with the title of Wanag Segued ("Precious gem"). He was very young, and his grandmother Helena assumed the regency. Hearing of the great power of the King of Portugal, from Covilham, she sent an Armenian, named Matthew, with a letter from the Negus David to King Manuel, who was well received at Lisbon; and a return embassy was despatched under Duarte Galvano, who died on the voyage. The advisability of opening a communication with Abyssinia was not lost sight of by the Portuguese Viceroy at Goa, and the death of Galvano only delayed the despatch of an embassy.

In April, 1520, the Viceroy led a fleet into the Red Sea to attack the Turks, taking Matthew, the Armenian, with him. He anchored at Massowa, where he saw the Bahar-Nagays, or Abyssinian Governor of the province bordering the sea, and some monks from the convent of Bisan, in the adjacent mountains. The leading members of the embassy were Rodriguez de Lima, a haughty, quick-tempered young officer; Father Francisco Alvarez, a priest, whose quaint narrative is the earliest and not the least interesting account we possess of Abyssinia; and João Bermudez, the Secretary, a bold and intriguing man, who was much mixed up with the subsequent history of the country.

The Portuguese went first to the monastery of Bisan, on the seaward slope of the Taranta Mountains, and crossing that range, arrived at the town of Barua, or Debaroa, on the eastern bank of the River Mareb, which was then the capital of the province ruled over by the Bahar-Nagays, or Lord of the Sea. The route of the embassy seems to have been nearly the same as that by Kiaquor, which Dr. Beke describes as a gradual and easy road, and well watered. After leaving Debaroa, they crossed the Mareb to Axum, and went thence through the district of Angot, by Lalibela, and the Rock of Geshen, to the court of the Negus David, in the province of Fatigar. The embassy was detained for six years in Abyssinia, during which time Father Alvarez had an excellent opportunity of acquiring a knowledge of the country, and of the manners of the people. His narrative was afterwards published at Lisbon, in 1540, and a copy of the original folio edition is in the British Museum. Ramusio gave an Italian version, and a French one was printed at Antwerp, in 1558. The indefatigable Hakluyt obtained an English translation, which is one of the quaintest and most pleasant bits of reading in the 'Pilgrims' of Purchas.

Soon after the departure of the Portuguese, Abyssinia was invaded by armies of Mahomedans from the countries of Adel and Hurrur on the south, and the Negus David was at last obliged to seek refuge in the almost inaccessible mountain of Damo, in Tigre, where he died in 1540,—his son and successor, Claudius, having taken refuge in a fastness of Shoa. In this state of affairs David had resolved to seek aid from the Portuguese; and the better to ensure their support, embraced the Romish faith. The physician, Bermudez, whom he had detained in Abyssinia, was sent first to Rome, and thence to Lisbon, to request military assistance. The King of Portugal did not hesitate, and Bermudez was despatched to Goa, with orders to the Viceroy to send an expedition in aid of the Negus.

In 1541, the Viceroy, Estevan de Gama, entered the Red Sea, and the expeditionary force was landed at Massowa; its command being entrusted to the Viceroy's brother, Cristoforo de Gama, accompanied by Bermudez. It consisted of 450 Portuguese musketeers, and six small field-pieces. Starting for the interior on July 9th, 1541, the little army marched for six days, suffering much from the want of water and the means of carriage, for they had only a few camels and mules which carried the artillery. At many places where the ground was rocky the camels were useless, and the men had to carry the burdens on their own backs. At the end of the seventh day they arrived at so steep a mountain that it took them the whole day to reach the summit. Here they rested for a time, and refreshed themselves with the cool breeze and the delicious springs that descended from the heights. On reaching Debaroa, Cristoforo de Gama united his forces with those of the Bahar-Nagays, and was joined by the Queen-Mother.

Mohammed Granhe, the terrible Moorish general, was in the province of Tigre, prepared to dispute the advance of the Portuguese with 1000 horse, 5000 foot, 50 Turkish musketeers, and some artillery. De Gama's army consisted of 450 Portuguese and about 12,000 Abyssinians, badly armed with spears and shields; but his own energy and dash at first carried all before him. He took the mountain fortress of Amba Zanet by storm, and during April, 1542, defeated Granhe in two pitched battles. He afterwards crossed the Tacazze and surprised the famous hill-fortress known as the Jews' Amba. But during the winter Granhe received reinforcements, and on August 28th, 1543, he defeated the allied army in a pitched battle. Badly wounded, De Gama was with difficulty prevailed on to accompany the Queen-Mother and the rest in their flight, and lagging behind was captured by the Moors and beheaded. Only

300 out of the 450 Portuguese escaped from this fatal battle. They retreated to the Jews' mountain, where they were joined by the young Negus Claudius, and in February, 1544, gained a brilliant victory over the Mahomedans, in which Granhe himself was shot by a musketeer. The Negus was eventually slain in a battle with the Mohammedans of Adel in March, 1559, and his body-guard of eighteen Portuguese were killed to a man in their gallant attempt to defend him. Yet the Portuguese were treated with the basest ingratitude. They married natives; and Dr. Beke tells us that to this day their descendants are called Francis, at Karaneo and in its vicinity.

The Jesuits who accompanied Bermudez fixed their head-quarters at Fremona, in Tigre, where they erected a church and fortified convent. The mission underwent numerous vicissitudes during many years, until the Jesuits were finally expelled. They made numerous futile attempts to fix the latitude of Fremona with an astrolabe, always being more than thirty miles out in their reckoning. As missionaries, the Portuguese Jesuits were eminently unsuccessful. The people preferred their own traditional form of Christianity, hated innovation, and insisted upon having a Coptic, not a Roman, Abuna. Bermudez eventually left the country, and reached Lisbon after a residence in Abyssinia of more than 30 years. His narrative was published at Lisbon in 1565. There is a copy in the British Museum Library, and an English version is given in the second volume of Purchas' 'Pilgrims.'

In 1604 Father Francisco Paez arrived at Fremona, who was by far the ablest European that has yet resided in Abyssinia. He added to great tact and judgment, and an extraordinary power of influencing the minds of all classes of men among whom he was thrown, an amount of ability which enabled him to succeed in nearly everything he undertook, from turning a stone arch to ruling the heart of a king; and a quickness of apprehension which amounted to genius. Under him the Jesuit mission rose into high favour, and both the Negus and his brother Sella Christos embraced the Romish faith. This gave rise to a rebellion, headed by the Coptic Abuna Peter, who was defeated and killed in a battle fought amongst the mountains of Samen. The rebel cavalry were seized with a panic, could not stop themselves, and 600 men and horses galloped over a precipice and plunged into a frightful abyss. While Paez lived the disputes between the Abuna and the Jesuits were kept within bounds. But the most lasting memorials of his genius are to be found in the ruins of churches, palaces, and bridges erected under his superintendence. He taught the workmen how to cut

and lay the stones. It is a proof of the stiff-necked savagery of the Abyssinians, that, with all these models under their very noses, they should still worship in churches and live in huts of which a West-coast negro would be ashamed. The good Father died after a residence of 19 years in the country. He left a narrative of his labours, of which there were many copies in the Jesuit colleges, but unfortunately it is not yet in an accessible form. There is a copy in the British Museum.

Father Alfonso Mendez was sent out by the Pope as the new Patriarch in 1624. He was accompanied by Father Lobo, and landed at Baylur, on the coast inhabited by the Dankâli tribes, approaching the highlands by a route which has only once been traversed by a European (Mr. Coffin) since their time. The Jesuits were finally ordered to leave the country by the Negus Facilidas in 1633.

The Paper will be printed entire in the 'Journal,' vol. xxxviii.

The PRESIDENT, in returning thanks to Mr. Markham for his luminous paper, said they must all wish him success in his geographical mission in connection with the Abyssinian expedition. He must say it gave him the most sincere gratification that Count Lavradio, the representative of the Portuguese nation, was present, and had heard the narrative of the exploits of his countrymen, who had been our precursors in India and in Abyssinia. His Excellency was a descendant of the first Viceroy of India, and it was peculiarly gratifying to him to know that Count Lavradio was founding a Geographical Society in Lisbon upon the plan of our own. He would now call upon Dr. Beke, who more than forty years ago received the Gold Medal of the Society, and who at that period threw more light upon the subject of Abyssinia than any traveller since the time of Bruce.

Dr. BEKE bore testimony to the general accuracy of the paper respecting the explorations of the Portuguese in the sixteenth century, and, having pointed out the error in all the maps with respect to the route from Hanfila (Amphila) to Senafé, taken by Coffin, explained the route now proposed to be followed by the British troops. They would not land at Massowah, but at Zulla, or Adulis, in Annesley Bay. The ruins of Adulis are to the north of the Hadás; Zulla is to the south of the Hadás. It was the route which he had himself recommended. He visited this place with his wife at the beginning of last year, for the purpose of exploring this entrance into Abyssinia, and he was happy to say that, after every other route had been examined, this had been selected.

The PRESIDENT asked if there was water at all times in the Hadás?

Dr. BEKE said, during the dry season the Hadás now has no water in the lower portion of its channel; but down one-half of its course, from its head at Tobónđa as far south as Hamhammo, a well-known camping-ground of the caravans, water is met with at certain spots all the year round; and even when at the driest, wells dug in the sandy bed of the river afford a constant and copious supply of that necessary fluid. During the rains in the upper country the floods of the Hadás, and of its tributary the Aligáddi, find their way down to the sea, and often render the river itself impassable. In February, 1866, he found the dry bed of the river between Adulis and Zulla to be 50 or 60 yards broad; and about a mile nearer the sea, they came to wells

sunk in the sandy soil, at which numerous horned cattle were being watered. From Zulla they went five or six miles further inland, and had the natives been well disposed, they would have gone on to Hamhammo, which was not more than 6 miles from their extreme point; but though disappointed in this, they succeeded in finding the road from Zulla to Hamhammo, which, instead of following the circuitous course of the Hadás, goes directly across the country, making the distance of Hamhammo from the sea-coast not more than 16 geographical miles; from the wells near Zulla it is only 13 miles. In the following month of March they went from Massowah into Abyssinia by the caravan road taken by Bruce, Salt, Rüppell, Krapf, and other travellers; and in May they returned to the coast by the same road. In doing so they had to traverse 26 miles of low and barren country between Arkiko and Hamhammo, where no regular supply of water is to be had; and instead of continuing up the bed of the Hadás to its source, they stopped at about 10 miles below Tohonda, and turned up the steep side of the valley by the pass of Shumfaito. It occupied seven days' slow travelling between Arkiko and Halai on the road up, including stoppages, and four days in returning. The actual time they were on their mules' backs was 25 hours going from the sea up into Abyssinia, and 20½ hours coming down. Of these intervals, respectively, 5 hours were spent in ascending, and 3½ hours in descending, Shumfaito. At Halai, at an elevation of upwards of 8400 feet, they had reached the table-land of Abyssinia, and yet they were so close to the coast—little more than 20 geographical miles—that they could perceive the sea beyond Arkiko to the north, and hear the firing of cannon at Massowah; while to the south and south-west for hundreds of miles extended the Abyssinian table-land, of which Amba Magdala is a detached spur, at a lower elevation than the table-land itself, approachable by a practicable road through Agame, Enderta, Bora, and Woffla, without crossing any large river, a considerable portion of which road had been trodden by himself.

The PRESIDENT: When you have got the army on the table-land, do you not see any great difficulty?

Dr. BEKE said, not if they kept clear of the rivers, which ran in valleys 3000 and 4000 feet deep. If an army crossed the rivers, they would have to go down one side of the valley, and ascend the other; and it would take them as long to march in that way as it would to go round the heads of the rivers on the table-land. Moreover, if they kept on the table-land, they could drop down upon any part of the country they pleased, between the valleys. The passes at the entry into the table-land were very narrow, and could be defended by a small body of troops; but there were no troops there, and the natives who held the passes could easily be disarmed by a bribe.

In answer to Mr. CRAWFURD, Dr. BEKE said he had not visited Magdala; he had visited Debra Tabor, which was about 40 days' march from the coast, of 10 miles a day. Magdala was somewhat nearer. An Abyssinian town was a mere collection of huts. Wherever the king made his camp, that became the capital of the country. If he remained there for a considerable time, the people would build a church of wattle and mud, or make it stronger with dry earth and straw. There were no stone houses except those built by the Portuguese. The convents were built of mud walls; of what few manuscripts there were in the convents, copies had been brought mostly to England.

Sir HENRY RAWLINSON, M.P., having referred to the various routes which had been followed by different travellers penetrating Abyssinia from the sea-coast, said that Colonel Merewether, who had good opportunities of obtaining information, was strongly in favour of entering by Amphil Bay. Dr. Beke, on the other hand, had first pointed out the advantages of Adulis, and for this he deserved great credit, as well as for having made known the physical configuration of Abyssinia. He had indeed rendered great service by drawing attention to the real nature of the so called precipitous passes, showing that

they were merely river-beds. All the rivers came down from the high table-land, and formed themselves into precipitous gullies of greater or less depth, some of them as much as 3000 feet in depth. Any army, therefore, which attempted to march at right angles to the line of the rivers would have to cross a succession of these precipitous gullies, descending 3000 feet on one side to ascend 3000 feet on the other. It was this circumstance which caused the character of the country to be regarded as so difficult in a military point of view. But if the troops kept close along the eastern edges of the table-land, they would get round the head-waters of these rivers, and avoid the difficulty of crossing them, and they could then diverge into the interior at any point they liked, between the rivers, along the shoulders which run down from the crest of the table-land. With regard to the point of entry, he quite agreed with Dr. Beke that Zulla or Adulis was much preferable to Massowah. The ancients were very good practical geographers, and they always selected the most favourable-point for their settlements. They chose Adulis, because a river there fell into the sea, by which they could pass on to the table-land of Abyssinia. Adulis was a port of great importance in the time of the Ptolemies; and in the fifth century, when the Greek monk Cosmos visited it, he found the throne of a Ptolemy still standing on the sea-shore, with a most important historical inscription engraved on it, which he copied. He did not know whether Dr. Beke had been to the ruins of Adulis.—(Dr. BEKE: Yes). Was there any trace to be found of the old throne?—(Dr. BEKE: No). Adulis and Axum were the only two places that he had ever heard of where ancient remains were to be found.

Dr. BEKE.—There is the Greek town of Senafé.

Sir HENRY RAWLINSON said wherever there were any Greek towns it was important to gather whatever relics might still be found there. Such remains were doubtless confined almost entirely to the sea-coast, because it appeared that in the interior of Abyssinia the people had never taken in any way to working in stone. Axum, Senafé, and Adulis belonged to a group of stations adjoining the sea. At one time there was a perfect howl of desperation in the periodical press of this country at the dreadful climate which our troops were going to encounter in Abyssinia. But as far as he could make out, Abyssinia was in reality one of the healthiest countries in the world. At any rate, compared with India, the highlands of Abyssinia were excessively healthy, so much so that he thought it likely that during our occupation of the country some points might be selected as a sanatorium for India. Another reason for selecting Adulis for debarkation was the short distance thence to the fine climate of the highlands. The plan of Sir Robert Napier was understood to be, to establish a depot on the nearest point of the high table-land from Zulla, a distance of 40 or 50 miles, and to concentrate the troops upon the plateau, whence negotiations could be kept up with the surrounding people, and a base of operations established for a further entrance into the country. As far as climatic or physical or military difficulties were concerned, he looked upon them as not very great. The political difficulties were another matter. For instance, if the captives were not forthcoming, the natural question would be, What are we to do? If they were taken away from Magdala, where were we to follow them? These points, and many others, would cause difficulty in the future, but they were points which did not immediately concern the Geographical Society.

Lord HOUGHTON said he thought the Government would be severely questioned as to whether all the advice which they could receive from Abyssinian travellers had been absolutely exhausted; whether Baker, Dr. Beke, and others had been consulted, and their advice taken and acted upon. He trusted that Sir Roderick Murchison, who, as representing the Geographical Society, was a real power in the matter, had been fully consulted. He said now, and he should say it hereafter, that if all the information and intelligence which

the Geographical Society had at command had not been brought to bear, the Government would have incurred a very grave responsibility. For himself, he was personally interested, having travelled many years ago to Upper Egypt with Mr. Mansfield Parkyns, who went forward and lost himself for five or six years, utterly unknown to European cognisance, in that mysterious country. Had Mr. Mansfield Parkyns been fully consulted, or any of the travellers in connection with the Society, as to whether the release of the prisoners could not be procured by indirect means? 100,000*l.* given for this object would be unimportant in comparison with the cost of an expedition.

The PRESIDENT said, as far as he knew, almost all the persons capable of giving advice, including Dr. Beke, had been consulted.

Dr. BEKE.—I have given information and advice, but have not been consulted.

The PRESIDENT said, at all events, the only suggestion which he ventured to offer during the recess, when he could not call together the Council, was immediately attended to by both the Ministers who have this expedition under their control. They immediately approved of scientific men and travellers being consulted; and they immediately directed the Topographical Department to make researches into all the travels that had ever been made, and to lay down all the different routes. As far as he had the means of judging, no expedition had left our shores in which greater pains had been taken, both on this side of the water and at Bombay, to bring together all the scientific knowledge they could respecting the country to enable the expedition to succeed.

Mr. DANBY SEYMOUR, M.P., said his object in rising was simply to answer the question put by his relative Sir Henry Rawlinson, When Sir Robert Napier got into Abyssinia, what was he to do? It was no doubt a difficult question to answer, but he did not think it was one impossible to answer. Supposing the prisoners were kept at Magdala, in that case Sir Robert Napier had his task clearly cut out before him. He had got to march by the road chosen for the route of the expedition to Magdala; and when once at Magdala there was no doubt about his being able to take the fort and deliver the prisoners, if they were there. We knew that the prisoners themselves wished that this expedition should be sent out, as their only mode of escape. But suppose King Theodore removed the captives from Magdala, the next question was, Where could he go with them? To the south there was the King of Shoa who had offered his assistance to the British Government, and had sent to Bombay to urge the release of the prisoners. Therefore, if King Theodore went towards Shoa, he would probably be hemmed in between two fires, and finding himself in this critical position he would probably release the prisoners. Next, suppose he did not go to Shoa, but took refuge in his native province of Kwara. There was a powerful rebel chief in arms against King Theodore in Godjam, and if the King attempted to get to Kwara he must pass through this danger. But supposing he reached Kwara, nothing would be easier than for our troops to pass through Kwara; and on his being driven from there he must fall into the hands of the Egyptians, who would not be very far from us. Therefore, when the question was asked, What was Sir Robert Napier to do? the answer was: First of all, he had to release the captives if they were kept in Magdala; if they were taken from Magdala, then, with the assistance of allies offered to the British Government, he had to pursue King Theodore, and it was impossible for him ultimately to escape. Moreover, it should be remembered, that with many other chiefs in arms against him, King Theodore was not the formidable adversary he was, when he was King of all Abyssinia. With regard to the scientific part of the expedition, he hoped it had been constituted in a manner commensurate with the importance of the occasion. To the south of Abyssinia was the country of the Gallas, who were described by Harris and other travellers as a superior and interesting people. It would be a pity if some of the persons attached to the expedition should not be allowed

to profit by this excellent opportunity to extend their inquiries into these most interesting regions.

Sir HENRY RAWLINSON said there was nothing to prevent King Theodore taking the prisoners from Magdala by Dembea into Kwara, his native province, where he was accustomed to take refuge in times of difficulty. If our troops followed him into Kwara, we might certainly drive him on into the hands of the Egyptians; but it was the special object of the expedition to avoid all complicity with the Egyptians, and that he believed to be the main reason for selecting Zulla instead of Massowah as the point of entry, Massowah having always been garrisoned by Egyptian troops, while Zulla was unoccupied.

The PRESIDENT, in reply to Lord Houghton and Mr. Danby Seymour with respect to the selection of the scientific members, said all he could do was to make a suggestion, and that suggestion was at once adopted by the Government. Although the persons that might have been recommended here might have been very suitable men, he knew that he could not have selected a better geologist than Mr. Blanford, who was to be sent from Bombay; and he ventured to say that we could not have found a more proper man to carry out the geographical explorations than their secretary, Mr. Markham. He had only to add that in the library of the Society there existed a large number of works on Abyssinia, which had been thoroughly well classed by Mr. Lamprey, their librarian, and had been consulted by the Government departments.

Second Meeting, 25th November, 1867.

SIR RODERICK I. MURCHISON, BART., K.C.B., PRESIDENT, in
the Chair.

ELECTIONS.—*William Ferneley Allen, Esq.*, Lord Mayor of London; *G. Andrews, Esq.*; *Geo. Armitstead, Esq.*; *the Duke of Buccleugh, K.G., &c.*; *Sir D. Baxter, Bart.*; *W. J. Best, Esq.*; *A. M. Bethune, Esq.*; *J. F. J. Cuttance, Esq.*; *G. E. Dalrymple, Esq.*; *J. Donald, Esq.*; *J. Edward, Esq.*; *G. E. Forbes, Esq.*; *R. M. Kerr, Esq.*, Judge of the Sheriff's Court; *the Right Hon. Lord Kinnaird, K.G.*; *W. Lawson, Esq.*; *Col. Lloyd Lindsay, M.P.*; *John Mackinlay, Esq., C.E., &c.*; *Duncan McGregor, Esq.*; *F. M. Metcalfe, Esq.*; *T. Muir, JUN., Esq.*; *J. Paterson, Esq.*; *Col. Sir Arthur Phayre*; *C. A. Pierce, Esq.*; *Rev. A. Raleigh, D.D.*; *A. J. Rhodes, Esq.*; *E. Spicer, Esq.*; *Lieut. Steel, R.E.*; *Lieut. O. B. C. St. John, R.E.*; *J. G. Taylor, H.B.M. Consul in Kurdistan*; *J. H. Tritton, Esq.*; *Capt. F. J. S. Venner*; *Rev. J. Waite*; *M. J. Barrington Ward, Esq.*; *B. Washbourne, Esq., M.D., &c.*; *Robert Spence Watson, Esq.*; *M. Woodifield, Esq., M.I.C.E.*

ACCESSIONS TO THE LIBRARY FROM NOV. 11TH TO NOV. 25TH.—*'Nathaniel Pearce—Life and Adventures of, during a residence in Abyssinia from the year 1810 to 1819.'* Mr. Coffin's Account of his Visit to Gondar. 2 vols. 8vo., 1831. Purchased. *'Journal of Mr. Blumhardt to Abyssinia, 1838.'* The late Travels of S. Giacomo Baratti into the remote country of the Abisines, 1690. Purchased.

Mons. Poncet—'Voyage to Æthiopia in the years 1698-1699 and 1700.' London, 1709. Purchased. Collection of printed and MS. documents relating to the Slave Trade on the East Coast of Africa, by James Macqueen, Esq. Presented by the Author. Views in Abyssinia, lithographs and photographs. War Office Topographical Department. Presented by the Secretary of State for War. 'Drei Monate in Abyssinia,' von F. H. Apel. Zurich, 1866. Purchased. 'Le Commerce de la France avec le Soudan,' par Henri Stucklé. Paris, 1864. Purchased. 'Phares de la Méditerranée et le Mer Noir. The French Marine. 'Cesare Moreno.' Extrait à la 'Figaro,' Jeudi, 1867. 'The Negro and Jamaica, 1866,' by Commander Pim. 'Reflections-Kreises Angular Distanzen,' von A. Moritz. Tiflis, 1859. 'Reise durch Kambodja nach Cochin China,' von Dr. Adolf Bastian. 8vo., 1863, Jena. Presented by the Author. 'Nova Zembla,' by J. Sporer, in 'Mittheilungen' of Justus Perthes. Presented by Dr. Petermann. 'A travers l'Amérique Centrale, le Nicaragua et le Canal interocéanique,' par Felix Belly. 2 vols. 8vo., maps, 1867. Purchased. 'Additional Inscriptions from the Hauran and the Eastern Desert of Syria.' 8vo., 1859. By John Hogg, Esq. Presented by the Author. 'Report on the Head-waters of the Rarua, New Zealand,' with Map and 20 illustrations. 1867. Julius Haast. Presented by the Author.

ACCESSIONS TO MAP ROOM SINCE THE LAST MEETING, NOV. 11TH.
—Two Maps of the Northern part of Abyssinia, from Massaua to Halai. Presented by Dr. Petermann. A Map of the Canary Islands. By D. A Map of Nicaragua, by M. de Sonnestern. Presented by the Author.

In commencing the proceedings the PRESIDENT said that all who knew with what tenacity he had opposed the general belief that Dr. Livingstone had been murdered, as reported by the Johanna men, and the conviction he had expressed, that with a few black men only the great traveller might carry out this mission as successfully as when, with Makololo men only, he formerly traversed and retraversed South Africa, would readily conceive with what delight he received the communication about to be read from Dr. Kirk, containing such very hopeful tidings relating to his dear friend. Lord Stanley had since forwarded to him the official despatches sent by Mr. Churchill, our Consul, at Zanzibar, on the same subject. The letter from Dr. Kirk to himself was as follows:—

"MY DEAR SIR RODERICK,

"Zanzibar, Sept. 28th, 1867.

"You know that a rumour has been current on the coast to the effect that a white man had been seen near Ujiji. Such a story came to us at a time when it was quite impossible that Livingstone could be the man. Now, however, another narrative has reached us, which, if we believe, it is I think difficult to avoid the conclusion that our distinguished traveller may even yet succeed, and disprove the story given us of his death by the Johanna men.

"A Banian trader at Bagamoyo told me three days ago that he had heard a rumour that some white man had been seen at Wemba; of this he seemed to

have no doubt. To-day he brought a native, whom he introduced and left alone with me. I entered into conversation with him, and led him on in an irregular way to give a general account of his journey, without guiding his imagination by any leading questions, determining to meet him again and fill in the details. When I had dismissed him, after my first conversation, it appeared that a ship would sail for Bombay immediately; and not to lose a chance, Mr. Churchill, the Consul, to whom I gave the notes, at once sent all to Bombay, with a request that the substance might be telegraphed to the Foreign Office; viz., 'that we had now some ground for believing that a white man resembling Livingstone had been seen to the south of the Sea of Ujiji.'

"This native, with the rest of the caravan, left Bagamoyo, and passed along the usual trade-route to Wemba and Marungu, where they remained trading for some time, and again returned to the coast. When in one of the villages under Marungu, which is a region governed by several chiefs more or less dependent on one paramount, a white man arrived with a party of thirteen blacks, who spoke Suaheli. All had firearms, and six carried double-barrelled guns. The white man was of moderate height, not stout, dressed in white, and wore a cloth wrapped round the head. He gave the chief a looking-glass, and was offered ivory, which he declined, stating that he was not a trader. He then went northwards. I do not know that this man can tell much more; he is a simple carrier who formed part of a caravan; but if we can find the head men of the party it will be possible no doubt then to identify this stranger, who seems to our hopeful imagination so like our long lost friend; and then, only think of the revelations he will have to make to us!

"It is decided that we go to Bagamoyo in two days, to make inquiry, but we must do so quietly.

"The story of a white man having been seen at Uruwa, to the west of the Lake, is a distinct thing from the more definite narrative we now have. But the one adds confirmation to the other, and shows us that if it be Livingstone on whose track we now are, that he has more than half finished his work, and is about to go to the Albert Nyanza. I may mention that there is now no doubt that the white man of whom I wrote formerly, long ago, as having been seen on one of the Lakes by an Arab who remained on the coast, was a Turk, one of the traders from Gondokoro, who have been met with in Uganda by Zanzibar merchants. The description fully satisfied me of this, and nothing is more probable. Thus the traders of Egypt and Zanzibar have now met in the interior of Africa. Speke's route has been quickly followed: how far this has been for the immediate benefit of Africa others may judge. In the end Africa will be overrun with traders in all directions, and then the vast resources of this continent will be shown.

"POSTSCRIPT.—Since writing the above, I have again seen my informant, and placed before him my books of photographic portraits. In the first book he did not recognise the likeness of the man he saw in the interior, although it contained a very fine side-view of Livingstone. In the second he at once pointed to a staring likeness of Livingstone, which I kept as a caricature, and said, 'That is the man.' 'But,' he added, 'come to Bagamoyo and see my master and the other men; they have seen him also and will tell you all they know.'

"Suspend your opinion for a little; Mr. Churchill and I go in two days to Bagamoyo to make inquiry. Please communicate this news to Mr. Webb and Miss Livingstone, and other friends; but, until my next, maintain some caution.

"JOHN KIRK."

The following despatch from H.M. Consul was next read:—

"MY LORD,

"Zanzibar, Sept. 28th, 1867.

"A native boat being on the point of leaving this for Makalla, near Aden, I hasten to transmit to your Lordship the copy of a despatch of this day's date, that I have addressed to the Chief Secretary to the Government of Bombay, acquainting him with the intelligence gathered within the last two days from people who have come from the interior of Africa, with reference to a white man having been seen seven months ago at a place called Marungu, 650 miles due east of Zanzibar.

"Since writing the accompanying despatch, the slave on whose information more particularly the belief of Dr. Livingstone being alive may be based, has, among a hundred photographs, recognised in the portrait of Dr. Livingstone, the man he saw at Marungu.

"This is indeed glorious news, and Dr. Kirk and I leave this for Bagamoyo, as soon as possible, to gather further information from the other members of the caravan to which the slave in question is attached.

"I have, &c.,

"H. A. CHURCHILL."

"The Lord Stanley."

STATEMENT made in the Suaheli language before Dr. KIRK, H.M. Vice-Consul, by a native lately returned from the interior of Africa.

"Zanzibar, Sept. 28th, 1867.

"The caravan to which this native belonged left Bagamoyo and followed the usual trade-route by Magara, Urori, and Wemba to Marungu. While they remained in one of the villages of Marungu a white man came from the south, having with him a party of thirteen natives, who spoke Ki-Suaheli. He was of moderate height, and not stout, and was dressed in white, and wore a piece of cloth folded round his head. His party were all armed, six with double-barrelled guns; the remainder with flint muskets.

"This white man gave the chief a looking-glass, and on being offered ivory in return, declined it, saying that he was not a trader, but was passing on to the next chief, but that he would accept any small thing as a token of friendship. To a Balooch of the trading party he gave a pistol, but whether this man is now in Zanzibar is now uncertain.

"It is now seven months since this white man was seen in the country of Marungu. Our informant gives the following particulars of his return route:—'Marungu is a level country. There are two rivers in it; one, the Chambezi, is full of hippopotamus; the other is smaller. In both the water flows gently to the north.

"The head chief of Marungu is named Kitumbua; there are four others, viz., Chuga, Kasouzo, Charika, and Chanza. From Marungu to Wemba is seven days' march. The chief of Wemba is named Chubanaŋga; there are under him Mtuka, Mwouva, Marurani, and Kombe. From Wemba to Mambwe is two days. To Umyamwanga seven days, to Wiwa two days. Nika is close to Wiwa. From Nika to Uruga three days, to Mafua three days, to Urori one day. From Urori to Uhehe is one month. To Usagara three days.'

"This statement was made only two hours before the departure of the mails. The Banian who brought our present informant, also states that at Bagamoyo there is a rumour that a white man has been seen alone in the country of Uruwa to the west of the sea of Ujiji. It will be necessary to go to Bagamoyo for the purpose of obtaining further information.

"JOHN KIRK."

The PRESIDENT then called attention to a communication from the Rev.

Mr. Price, Chief of the Church Missionary Society at Bombay, from whose establishment Dr. Livingstone took the educated negroes who were now with him. Mr. Price, like himself, disbelieved the story of the Johanna men, not only on account of their mendacious character, but for other reasons. For his own part, the President accounted for their desertion of Livingstone in this wise. They were men of the coast, and had a rooted dislike to go far into the interior of Africa, with the language and people of which they were unacquainted. Now, when these men reached the last station from which there was a chance of retreat to the coast, they resolved to abscond; and trumped up this story of Livingstone's death to account for their return, and make good their claim to the wages due to them. The question, however, would speedily be set at rest by the Expedition which had been sent out by the Government under Mr. Young. If the story told by Moosa should turn out to be true, they would have to mourn the death of Livingstone; and in that case these Johanna men would be entitled to the wages they claimed; but, should their story turn out to be as false as he (the President) believed it to be, then instead of payment they ought to receive punishment—an opinion he had already expressed to H.M. Secretary for Foreign Affairs. Mr. Price wrote as follows:—

“There is, moreover, one circumstance to which no reference seems to have been made, but which, nevertheless, strongly induces me to disbelieve the reports which have come to hand, and to cherish the hope that Livingstone is still alive, and pursuing his useful career of discovery in the heart of Africa. It will be remembered that the Doctor took with him nine African Christian lads, who had been brought up at our institution at Sharanpūr. These were, without exception, intelligent youths, about twenty years of age, and had a tolerable knowledge of English. Most of them possessed strong physical development, and, being fired with a desire for enterprise, cheerfully volunteered to accompany Dr. Livingstone. I call to mind how, when the Doctor had them together in my verandah, after giving them some account of the kind of life they had to expect and the difficulties that lay before them, he concluded his remarks by saying, very impressively, ‘Now, my lads, you see we may have to encounter hardships and dangers; but bear in mind, above all things, that whatever happens, you must stick close to me.’”

It appeared that these youthful Africans had stuck close to Livingstone, and the result was that, with the addition of two or three men, as he went forward, to act as carriers, he had thirteen men with him when he was seen by the native informant of Dr. Kirk, and they all carried the muskets which we knew the expedition had been supplied with. He hoped the day would not be far distant when Livingstone, issuing by Lake Albert Nyanza and the Nile, would appear among them again; and it was the wish of his heart that he might live to preside at his reception and to congratulate him on an enterprise which was not only interesting to them as geographers, but which touched the heart of the whole British nation.

CAPTAIN SHERARD OSBORN said as one of those who supported the President in his original opinion, as to the amount of belief to be attached to the story of the Johanna men, he cordially agreed with him in believing it would probably turn out that Livingstone did not perish at the head of Lake Nyassa. He would go further and say, that if Mr. Young should reach the same point and bring back the same story, he would not believe that Livingstone was lost. He attached little value to Dr. Kirk's intelligence. The value of Johanna news was about equal to that picked up in the bazaar at Zanzibar—Dr. Kirk killed Livingstone one mail, and brought him to life the next. It was the natural habit of the Asiatic or the African, when a man passed beyond the little district in which he lived, to suppose that he was lost. He could state, from his own experience as a traveller and geographer, that as soon as

a traveller had passed over the boundary which separated the known from the unknown, there usually arose some rumour that he was lost. This fact had come very vividly to his mind in connection with the men whom they thought, nine years ago, were lost in the Franklin expedition. After years of struggle and search for them, and after they were given up as certainly dead, he feared from evidence that has since reached us that some of them were living long after they were despaired of. Nothing, therefore, would cause him to act on the assumption that Livingstone was dead until we had indubitable proof of the fact. To turn to a more practical point, he would ask the Society to take it into their deep consideration, now that Livingstone was known to be pushing to the northward, whether the time had not come that somebody was sent from the northward to meet him—Sir Samuel Baker, if he could be obtained, if not, another good and enterprising explorer.

Mr. D. J. KENNELLY said he could confirm the testimony of the Rev. Mr. Price, respecting the young Africans Livingstone took with him from Bombay. They were educated at the Sharanpūr Mission, an industrial institution of the Church Missionary Society. They were very intelligent boys, and from their education and the ideas they had received in India through mixing in Society, he believed they would be very helpful to Livingstone.

Mr. HORACE WALLER (formerly lay member of the Zambesi Mission) said he thought they might find in Dr. Kirk's letter reasonable ground for the hope that Livingstone was still alive. There were one or two things that almost identified Livingstone with this white man who had been seen. No double-barrelled guns would be seen in the hands of any other set of men in the interior, not even if this had been a trading party coming up from the Portuguese settlement in the south. He believed that to be one of the strongest proofs of identity. As to his dress, he was rather at a loss, unless the Doctor had by some chance lost that consular or navy cap with which they were all so familiar. It was always a surprise to his friends, when on the Zambesi that he would never shield his head from the sun. Another strong point in the evidence was the rejection of ivory by the traveller. In that country a mere traveller was not understood at all; it at once excited suspicion among the chiefs. He regretted to say that not once in a century did a white man pass into that distant country who was not a slave dealer or an ivory trader. The fact of the white man who was seen being not a trader was a strong circumstance in favour of its being Livingstone. With regard to the boys who were with him, two of them the Doctor had liberated from a Portuguese slave gang on the Shiré. They were his special favourites, and he took them to Bombay and had them educated there. These lads knew the object of the expedition, and they promised that they would return with Dr. Livingstone, come what might. He must confess that when Moosa brought the story of one of these boys, Wakotani by name, having deserted the Doctor, it at once smacked to him of falsehood. He had before told them his opinion of Moosa and his companions. A greater set of scoundrels never existed; they could not tell the truth even by accident.

Mr. CRAWFURD said he should have been very glad to believe that Dr. Livingstone was still living, but he could not bring himself to that belief. He could not discover in the evidence produced anything to warrant the statement that Livingstone lived. What did it amount to? Simply to this, that a native belonging to a caravan had seen in the interior a white man of middle stature. That white man might have been any other European, or even a Turk. If that white man had been Dr. Livingstone, would he not, knowing that the caravan was proceeding to the coast, have sent some evidence by the party to inform his friends of his whereabouts? He had a word to say in favour of Moosa. Dr. Livingstone had great friendship for Moosa; he twice selected him because he specially trusted him. And this was the man

who was supposed to have abandoned Livingstone. For his own part he was disposed to believe in the story that Moosa told.

Mr. LAYARD, M.P., asked if the young negroes mentioned spoke the language of the country to which Livingstone was going?

Mr. KENNELLY said some of them were from the Somāli country, where Suaheli was spoken.

Mr. WALLER said the two boys belonged to the Wahiao tribe, which extended over a very wide region in that part of the country. They spoke the language perfectly, and it was for that reason that Dr. Livingstone wished to take them. The Suaheli language would be spoken by the Somāli lads who came from Bombay, so that the Doctor would have the advantage of the Suaheli language as well as the Wahiao. With regard to Mr. Crawford's remark about Livingstone not sending letters to the coast, it must be remembered that the party to which Dr. Kirk's informant belonged was a slave caravan, and it was very likely Dr. Livingstone saw it would be useless sending letters down from the interior by such means, for these traders were too much afraid that their doings would be known on the coast, and could not be relied upon for the safe conveyance of the Doctor's letters.

Mr. LAYARD asked Mr. Waller if, in the event of Dr. Livingstone being killed, he thought these young men would have returned to the coast.

Mr. WALLER. Their first object undoubtedly would be to return to the coast and report themselves to the English at Zanzibar, amongst whom were some they had known on the Zambesi.

The PRESIDENT, referring to a remark by Captain Sherard Osborn, explained that he did not intend to convey the impression that Livingstone would be considered as lost should it turn out that the expedition sent to the head of Lake Nyassa failed to discover any traces of him. All that he said was that the expedition under Mr. Young would set at rest the question whether he was killed at the spot reported by Moosa or not. With respect to his old and valued friend, whom they called their "Objector General," he was astonished that Mr. Crawford stood forward to say he really believed in such a man as Moosa. Upon this point he would read a paragraph from a letter by Sir Thomas Maclear, astronomer at the Cape:—"Moosa's statements are valueless. Mr. Young intended if possible to get hold of the fellow and to take him *vi et armis* to the locality of the tragedy that he reported; but I suspect Moosa would not afford an opportunity to be caught." With regard to the suggestion of Captain Sherard Osborn, that an expedition should go from the north to meet Livingstone, he would state that he had received a letter from Sir Samuel Baker, who was formerly an unbeliever in the safety of Livingstone, and who argued strongly in favour of that view at the meeting of the British Association at Dundee, but who was now of a different opinion. He said in his letter that he wished the Viceroy of Egypt could be induced to fit out an expeditionary steamer to the Upper Nile and Lake Albert Nyanza. If this were done, he (Sir Samuel) would be glad to offer his services to lead it and meet Livingstone in his way northward from Lake Tanganyika.

The following Paper was then read by the author:—

1. *Explorations in Central America, accompanied by Survey and Levels from Lake Nicaragua to the Atlantic Ocean.* By JOHN COLLINSON, Esq., C.E., F.R.G.S.

THE Panama Railroad, admirable as it is, does not nearly fill the requirements of the immense traffic across the Isthmus of America, nor, on account of the deadly nature of its climate and the ineffi-

ciency of its terminal Ports, does it offer inducements to passengers to avail themselves of its otherwise great facilities.

Feeling this further requirement, Capt. Bedford Pim, who had previously distinguished himself in the discovery of the 'North-West Passage' route, carefully examined the harbours and contour of the interlying country, and came to the conclusion that the best opportunity for establishing the much needed communication was by taking advantage of a Bay (since called Pim's Bay), about 35 miles north of Greytown on the Caribbean Sea, crossing the intervening tract of country between it and Lake Nicaragua by rail, steaming across the Lake and connecting with the Pacific Ocean either at Realejo or at San Juan del Sur, both excellent harbours.

He then took the first step to prove the advisability of this route by surveying Pim's Bay. Realejo and San Juan del Sur were too well and favourably known to require further examination, the country between Lake Nicaragua and these two ports had been surveyed and repeatedly examined for canal and railway schemes, and the latter reported as not only practicable but facile of construction; that which remained to be examined was the country between Pim's Bay (the Atlantic Terminus), and Lake Nicaragua,—the most formidable work however of all to the investigator, from the fact of its being a terra incognita, uninhabited and covered with a dense primeval forest and jungle, stretching from lake to ocean over at least 85 miles in a direct line.

In 1863 the first attempt was made to explore this tract; Captain Pim went out to Nicaragua accompanied by two civil engineers, Mr. Salmon and myself. On arriving there the work was portioned out to us in the following manner: Mr. Salmon was entrusted with the part lying between the utmost navigable point on the Rama River and Lake Nicaragua, while to me was allotted the remaining section lying between that point and Pim's Bay. Full accounts of the two expeditions were given at the Newcastle Meeting of the British Association, 1863. Suffice it to say, that after considerable hardships I succeeded in penetrating across to Pim's Bay; and Mr. Salmon, after bravely struggling against want of provisions, desertion, and the tropical downpour of the rainy season, was at last obliged to retreat, baffled and barely escaping with his life, from his endeavour to reach the Lake.

In 1865 another attempt was made to cut across, this time under Colonel Cauty, who, though a hardy backwoodsman accustomed to living for months in the forests, had to succumb, his men finally threatening to carry him back forcibly unless he would consent to lead them back to safety and plenty.

Such was the state of affairs when I arrived in New York with Captain Pim in January of this year; and, at the instance of certain American capitalists, I undertook to cut a clear track through from lake to ocean,—for which purpose I arrived at Greytown on February the 11th.

The hurriedness with which all this had to be arranged left me scarcely any time for preparations; just enough to purchase a few necessary instruments in New York, and none to engage assistants; but luckily on my voyage to Greytown I met, on board, Mr. Deering, an engineer on his way to California, and engaged him to assist me. He became my right hand man, and by his pluck and determination contributed greatly to the success of the expedition.

On arriving at Greytown I found to my regret that an alarm of cholera, from which the natives flee like the Hindoos in the East, had driven them nearly all away, and do my best I could only engage 5 Caribs and one Creole (as cook) to accompany me.

We started up the river San Juan on the 16th of February. But, before leaving Greytown, a word about its harbour and river. Conclusive natural evidence proves that centuries ago the sea covered the entire space now occupied by the mouths and swampy deltas of the San Juan, while among the historical accounts of the country are distinct records of the time, in old Spain's palmy days, when her ships of war regularly sailed up the river and across the Lake to Granada.

Now, a shallow canoe, steered and paddled by dexterous Caribs, can hardly clear, on the crest of the wave, without touching the bar; and light river-steamers with stern-wheels, and drawing when laden only 10 inches of water, can scarcely grope their way from rapid to rapid, whose rocky bottoms strewn with boulders, and whose rapidly flowing current, effectually bar their further passage.

Every year it becomes more evident to all living on its banks or using its stream, that the flow of water is becoming less in the San Juan; and even the least observant native, dwelling on the Lake, will tell how its banks are rising year by year visibly before his eyes, how the River Panaloya connecting the two great lakes is becoming drier every season, so much so that at times lately no water-connection has existed between them. Noting the fact that these lakes are in the middle of the great volcanic range bisecting the Isthmus, which dies out to nothing before reaching the low alluvial shores of the Atlantic, may it not be conjectured that the gradual upheaval of the centre, while the coast has remained almost unmoved, should year by year increase the gradients of the river, and by creating a more rapid flow of water cause the percep-

tible drainage of the Lakes and lower the level of their waters? Also, will not this help to account for the formation of the deltas and silting up of the estuary of the San Juan?

Formerly the river must have flowed out calmly almost on a level from lake to ocean, whilst now the turbid waters, hurrying down with ever increased velocity, carry with them the débris disturbed by the floods of the rainy season, till suddenly they find a level bed; and the resistance of the denser sea-water, with the frequent violent "Northers" of those latitudes blowing full upon them, they are arrested in their course, and deposit the suspended material.

To return—after a laborious ascent of the river, I was landed at the village of San Miguelito with my small party. Commencing work on Monday, February 25th, through the stunted undergrowth that clothes the shores of the lake, and which swarms with gallipatos, those terrible pests of the Tropics, we proceeded with great rapidity; and, on March 1st, had so far advanced, that it was advisable to pitch our first camp. That night we swung our hammocks for the first time in the open air, and in spite of mosquitos slept well.

On Tuesday, the 5th, we entered the forest, which extended from there without break, eastward, to the ocean. Up to that time we had been traversing the savannahs which skirt round the borders of the lake, and lie inland in places for many miles. These savannahs are immense plains, sometimes slightly undulating with hillocks clothed with trees standing up, at intervals, like islands in the long grass which will often overtop the heads of the horsemen. In crossing these savannahs, and for some time after entering the forest, we suffered dreadfully from want of water, and were only too grateful to obtain any dregs that might be left in the pools frequented by the Dantes or Tapirs (*Elasmotherium bairdi* or *Tapirus bairdi*), and used by them alike for drinking and bathing.

We could trace the commencement of Cauty's old piquete, on entering the forest; but, as I soon found it inclining too much to the southward, I decided to quit it and strike out an independent line.

Friday, the 8th, one of my men, who had been despatched on Wednesday to San Miguelito for provisions, arrived with a welcome supply; but what we needed most was water, and had it not been for a large vine ("Bejuca"), which seems planted by Providence in dry regions, where alone it flourishes, and which yields on being cut a moderate supply of wholesome clear water, our sufferings would have been unbearable.

The forest now began to take a more distinct character, as inter-

mixed with the everlasting palms, india-rubber trees, sapodillas, cedars, and, further on, mahoganies occurred in magnificent groves, sprawling their enormous roots over acres of ground, and rearing their vast height from the jungle beneath almost, as it seemed, up to the clouds.

Tuesday, the 12th, I shot four guans (*Penelope*), the smallest species of turkey inhabiting the American forests. The country now became more broken up, our course crossing several spurs of a high range, running to the north of us, west and east.

Mr. Deering began to feel the effects of drinking the filthy water we had been obliged to put up with. On Saturday, the 15th, however, greatly to our joy we came on a watercourse with several large and clear pools.

Monday, the 18th, we crossed the first running stream since leaving San Miguelito, and on the following day three Caribs, whom I had requested Captain Pim to send me from Leon, arrived; one of whom, Perry by name, an elderly man, I installed as "Boss" of the party.

Our total distance up to leaving off work on Saturday afternoon, was $17\frac{1}{2}$ miles, in 24 working days; not so bad, taking into consideration the small number of hands. But now, having had a fair opportunity of comparing the work of these Caribs with that of the Mosquito and Woolwa Indians, employed on my first expedition, I must say that the latter were by far the best workmen. There were two very serious drawbacks to the Caribs: firstly, they were excessively particular about their food and personal comforts; if they had not for every meal plenty of meat, dampers, and vegetables well cooked, there was always great grumbling and an attempt to shirk work; they also insisted on having blankets and mosquito bars for the night, which increased the bulk of our loads very seriously; and, secondly, they always have some man among them, generally the biggest and laziest, whose dictum is invariably followed in the blindest and most obstinate manner—reasoning is wasted on them. The Indians, on the contrary, though they certainly complain if not kept well filled, are content with anything as long as they have sufficient of it to create a sense of repletion. When provisions were not plentiful, they would often sit up all night boiling and eating eboe-nuts (*Dipterix oleifera*), which quite satisfied them if they could obtain enough. As for wardrobe it was all carried in the shape of a small cloth round the loins. Their respect for a white man is very great, and the virtue of obedience is rarely questioned by them.

The country which we had passed through, nowhere in our course

attaining a greater height than 400 feet above the level of the lake, had for the last few miles been broken up a good deal by isolated hills; but, on Thursday the 28th, we crossed a considerable plain stretching as far as the eye could reach to our north, and bounded on our south at a distance of 5 or 6 miles by the spur of a range running north-east and south-west, which we crossed on Saturday, at a height of 716·94 feet above the lake, and at a distance of 21 miles 528 yards from San Miguelito.

On that same day in the evening, on coming into camp, I was gladdened by finding that Lieutenant Oliver, R.A., had arrived with four men, a mule, and two bullocks laden with provisions. Mr. Oliver, at my request, volunteered to remain with us and give his valuable assistance to the expedition. As an instance of the difficulty in travelling through this country I may state that Mr. Oliver started with six bullocks, lightly laden: only two of which arrived, the rest dying on the way.

In the morning one of my men shot a wari (*Dicotyles tajacu*), the first large animal which had fallen a prey to us; we had shot a few turkeys before, but it was remarkable how much less game there was in the country than formerly. No animals seemed to be plentiful now, except jaguars. The natives accounted for the phenomenon in this wise:—Two years ago a terrific hurricane, similar to the one which has recently devastated St. Thomas and Tortola, swept over the country, utterly destroying Blewfields, and laying low vast tracts of the forests. The wild animals and birds were destroyed by myriads, and sought refuge in the very roads and houses of the little clearings on the coast of the ocean and the lake, where they were killed by the inhabitants. Since then hunting has become a profitless employment; but the jaguars, too hardy and cunning to be destroyed by the same means as the other game, have grown bolder and more ferocious, attacking men wherever they meet them, and even taking the town of Blewfields by storm. I was assured by most credible witnesses, that while we were in the cutting seventeen jaguars marched into that place one morning, and frightened the inhabitants so much by their numbers and appearance, that they shut themselves up in their houses while the jaguars killed every goat in the place—the only animals kept on the Mosquito coast.

Tuesday, April 2nd, 24 miles from San Miguelito, we struck a large stream running to the south-west. Accompanied by Mr. Oliver, I explored it for about a mile both ways. Along its banks we found in many places “machete” cuts, and I concluded that it had been visited by rubber-men, as no one else would have cared to

penetrate to such a place. I set it down as a tributary of the Tule, the only river between San Miguelito and the San Juan, visited by rubber-men. Height above lake at crossing, 202.02 feet.

A large river was met on Friday, running to the south-west, and crossed $26\frac{1}{4}$ miles from San Miguelito at a level of 286.68 feet above the lake. This, I feel confident, is the main Tule River, and the one we crossed on the 2nd, a tributary from the north. As I felt pretty confident, from former observations, that the course of the Rama River is nearly east and west, and that it is of considerable length, I now looked forward to attaining the summit-level dividing the watersheds of the Atlantic and lake.

We came across the Soupar palm (*Guilielma speciosa*) on Saturday the 6th, for the first time; this palm is universally grown by the Indians round their houses, and its fruit, tasting much like a yam, is boiled and eaten when ripe. The tree is about 60 feet in height, with a straight stem covered by regular bands of long black prickles, used by the natives as needles; the appearance of the leaves on the top is similar to the cabbage-palm.

After ascending gradually for the next few days, we, to my delight, espied for the first time a grove of four eboe-trees (*Dipterix oleifera*): I took this as a certain sign of our proximity to the summit-level, as none of those trees grow on the lake and Pacific slopes of the isthmus. At the same time the vegetation, as if by magic, changed; on the lake slope the woods are principally hard and small-leaved. Mahoganies (*Swietenia mahogani*), cedars (*Cedrela odorata*), lance-wood (*Duguetia quitarensis*), lignum vitæ (*Guaiacum officinale*), and india-rubber (*Castilloa elastica*) are distinguishing features; the jungle is exceedingly tough, in many places miles of prickly pear (*Bromelia karatos*), bamboo, with "bejucas," and vines, which tried the sharpest "machete" and strongest arm to cut, while the surface of the ground, except in the bottoms of the valleys, was arid, stony, and so heated that our feet were burnt and blistered by it; watercourses were comparatively few, and many of them dry. Such a country was quite unfamiliar to my previous experiences, but now every day the changing vegetation and aspect of the country reminded me more and more of the Mosquito coast. The vines became green and tender, the great coroso and cabbage-palms were now mixed with the swallow-tail (*Geonoma*), so useful for thatching, and the ribbon-like leaves of the *Circuligo latifolia*, while the prickly and club-rooted zanona (*Socratea*) would mingle their foliage with the locust-trees (*Hymenæa courbaril*), the entada with their mahogany seeds; and the swelling trumpet-trees (*Cecropia peltata*), sarsaparilla (*Smilax medica*), and the clinging vanilla began to appear, and the

invaluable silk-grass (*Bromelia*) took the place of the prickly pear. Lovely tree-ferns gave their incomparably delicate appearance to grace the vegetation; running streams occurred more frequently, and the ground became springy and cool under our feet, while it acquired that rich black colour so suggestive of fertility.

Thursday, the 11th, the day we first descried the eboe-trees, I had to try the skill of my men as bridge-constructors. In the bottom of a level valley, a small stream wended its way through peat, which it saturated, and thus rendered most treacherous for our animals. Selecting the narrowest crossing, some 30 feet, in less than half an hour we threw over it a substantial bridge; but alas! for the impotence of the human will against a mule's; though our now solitary steady-going ox crossed with perfect safety, neither force nor persuasion could induce those obstinate brutes to trust themselves to it, and finally they all made a frantic rush into the bog, where, sinking up to their middles, they philosophically stood stuck fast. Their loads had now to be taken off and carried across by the men, and the stubborn beasts pulled out by main force by their ears, legs, and tails,—all the time resisting as hard as they could; and sometimes, just as they were being landed on the bank, succeeded in breaking loose and rolling over and over till, at last, they were sticking again in pretty nearly the same place they had been rescued from.

During the night we had a serenade of jaguars, or, as the natives call them, tigers; and, in the morning, their tracks were visible all round the camp.

As we ascended the great dividing ridge, our compasses, which had often before shown, near any ranges of hills, singular variations from true north, became more and more affected and unreliable, so much so that they were utterly useless. The iron in the basaltic rocks would have, perhaps, explained this, but that the variation until we passed the summit was always much to the east, while the great ridge stretching down from the northern part of the Chontales district of Nicaragua, in the direction of the San Juan River, and becoming less and less as it went southward, would have naturally attracted the needle closer to true north. More extended examination of the tract north and south of our line will, doubtless, reveal the cause of this curious phenomenon; but, while unaccountable in itself, it explained to me one of the causes of Cauty's ill-success, as he, unacquainted with the use of the theodolite, trusted to his compass-bearings, which took him a long way south of his true course into the heart of the great valley of the Indian River. Other curious causes of variation were some of the enormous ma-

hogany and wild cotton-trees (*Ceiba bombax*), which would often attract the compass as much as 3° .

On Saturday, April the 13th, we at last attained our summit-level, 619·86 feet above Lake Nicaragua, and 747·86 feet above the Atlantic Ocean level, at a distance of 31 miles 1448 yards from the former, and 69 miles 1145 yards from the latter.

Our provisions were now getting very low, and we were obliged to make our meals off rice mixed with—whenever obtainable—a delicious wild honey collected by a very small species of bee, not larger than an English house-fly.

Tuesday, the 16th, spite of promises of rewards and increased pay, the six Caribs and one Spaniard deserted us, stating as their reason that they could not longer live on frijolas, which gave them in their expressive language “belly-swell.” Our party was now reduced to ten in all; however, not the slightest hesitation was shown, but a firm resolve prevailed to reach the Atlantic in spite of all obstacles.

Next day a Spaniard, who had been surveying for me at Realejo, arrived at our camp accompanied by an American and a native, informing me that Captain Pim was coming to pay us a visit the next day. Early on the following morning he arrived at our camp, which was named after him “Bedford Camp.” Shortly after his arrival we went on ahead to the cutting party, which had been despatched to work early in the morning; and, to complete the pleasure of the visit, we found that the party had just struck a large river running in our course to the east, over large basaltic boulders and in deep and wide pools. This was by far the most considerable river we had yet met, and turned out to be, as we assumed at the time, a tributary of the north branch of the Rama River. I named it “Susannah River,” after Mrs. Pim; its distance from San Miguelito was 34 miles 870 yards, and the water 398·62 feet above the Atlantic.

Next day, Good Friday,—a day religiously kept by the Spaniards—was declared a holiday. Captain Pim left us in the morning, expressing an intention of accompanying a party, who, according to instructions I had left at Greytown, were to start on the 25th inst., with provisions to meet us at Rama station. The following morning we left Bedford Camp, which was $33\frac{3}{4}$ miles from San Miguelito, and after crossing the river three times, struck it again at some beautiful falls, which were named after Mrs. Collinson, “Cecilia Falls.” The river above them lay in a deep, wide pool, and suddenly meeting a breastwork of basaltic rock, was confined in a narrow channel, over which one could jump during the dry season, fell

into a deep hole in the rock about 15 feet below, and then rushed down boiling and bubbling over a layer of rock strewn with boulders. The rock presented a very curious appearance, from the fact of its being covered all over with circular holes, from 6 inches to 3 feet deep, created by the action of shingle worked round and round by the falling water. Here we observed a very curious small lizard (*Anolis sp.*), which has a yellow pouch under his breast which he expands on being frightened, and often intimidates his foes by the action. He frequents the banks of rivers, and is very fond of basking on dry stones in the water.

The work of moving was now getting day by day more laborious, on account of the soft bottoms of the innumerable small streams we had to cross, and in which the mules invariably stuck fast.

Our course again crossed the Susannah River, which had been winding round some hills to the north, on Saturday, the 27th, at a distance of $39\frac{1}{2}$ miles from San Miguelito, and at a level of 251.27 feet above the Atlantic.

Before reaching it we came on a very curious cave, hollowed out of the side of a high hill: the orifice was about 2 feet in diameter, swelling out in the interior as far as we could see to about 6 feet each way. A few days afterwards we discovered two similar ones. The natives declare them to be made and inhabited by a large owl.

The weather up to this time had been unusually fine, not more than three wet days since quitting San Miguelito, but at night a shower was a frequent occurrence; the temperature was often very chilly, about 2 o'clock in the morning, after crossing the dividing ridge, but before doing so the nights were nearly as sultry as the days.

Our animals were now reduced to four by the loss of another mule, two of which were hardly of any use, showing unmistakable signs of giving in. On Tuesday, 30th, the last horse died, and the next day our bull was nowhere to be found. The supply of grass for the animals in these dense forests was very limited, and we were obliged to let them roam at their will during the night, so as to forage for themselves. The most diligent search could not discover the bull, and we were, to our sorrow, compelled to conclude him devoured by jaguars, or lost beyond chance of recovery.

On Wednesday, May 1st, we found the Susannah River running parallel and quite close to us, and suddenly on nearing it on our right we came full into a much larger river, running to the south, crossing our course at right angles, and then turning sharp round to the east, in which for the first time since quitting the lake numerous alligators appeared swimming about. The joy at this discovery was

beyond measure: our provisions, with the exception of a few frijolas, expended, our carrying facilities reduced to two poor mules, barely able to totter along, the men had fancied that the Susannah was no tributary of the Rama, and that following it as we did, day by day, with no perceptible increase in its volume, we might go on until death by starvation should kill us one by one. This melancholy picture seemed ever before their eyes; but when we suddenly, without notice or warning, came on the junction of our river with one three times its magnitude, running majestically between banks of long "scutch"-grass, with the broadleaved *Heliconia bicolor* flourishing in the first open sunlight met during the wearied time we had toiled from San Miguelito, the very sight of the sun and cloudless sky, after the darkness and ghostly forests, seemed to give fresh light and vitality, while the appearance of the river-banks,—so suggestive of the San Juan and other well known streams—gave to their imaginative minds omens of a speedy arrival at the habitations of men.

This fine stream was undoubtedly the north branch of the Rama, and was crossed by us $41\frac{1}{2}$ miles from San Miguelito, at a height of 229.64 feet above the Atlantic, and could not be very far from its junction with the south branch, the furthest point to which our former explorations of the river in 1863 had extended. A camp was immediately pitched here, as the "scutch"-grass on the banks offered such a capital opportunity for the mules to recruit. In the afternoon Mr. Oliver had a very narrow escape from a puma (*Felis concolor*) which sprang at him when jumping across a stream, from behind a tree overhead. Though his gun was only loaded with B.B. shot, fortunately the two charges settled the brute, some of the shot penetrating his brain; his skin was soon peeled off, and preserved as a trophy.

We now were obliged to come to the conclusion that the two remaining animals could not possibly carry baggage for all; and I made up my mind to have a raft built, so that, while keeping the survey as close as convenient to the river, the things might be floated down from camp to camp. Such being my decision, I started off with the two mules, a tent, and a few necessities, with the cutting party on the 3rd, with the intention of working until we again hit the river, when I would despatch a messenger back to the Junction Camp, where I had left instructions to have a large raft built of "mountain-mahoe" wood. This is an invaluable tree to the natives in that land of many lagoons and rivers, from its extreme lightness, as also from its affording a species of brown cotton, very soft, and much used by the better class of Creoles for stuffing mattresses and

pillows; when growing, it is extremely like, and hardly to be distinguished from, the trumpet tree.

We worked at the cutting on the 3rd until quite dark, and not having yet reached the river, were forced to camp in a bamboo-thicket with no water, so that it was necessary to send men back over half a mile with lanterns to obtain sufficient to quench our thirst. At about 9 o'clock, however, next morning, we heard a great noise of falling water to our right, and, cutting a narrow track through in the direction of the sound, we came on some beautiful falls of the Rama, not unlike, though much larger than Cecilia Falls, distant from San Miguelito 44 miles. A man was at once despatched to the party behind under Messrs. Oliver and Deering, with instructions for them to raft it down the river at once; and in the evening we were joined by the whole party.

That evening I held a council, in which our position was seriously considered. We found on examination that all the provisions we had left were frijolas enough to supply two meals for all hands, and absolutely nothing more. I therefore decided to start at daybreak on the morrow down the river on the raft with Oliver, two Spaniards, and two Caribs, to try and discover the party from Greytown with provisions, leaving Deering in command of the remainder, with orders to follow us in two days if we had not then appeared.

Our camp was pitched that night about 200 yards from the river, in a thick bamboo-brake; and during the evening we were disturbed several times by hearing wild beasts walking very close to us: however, about 10 o'clock, well worn out with the fatigues of the day, Oliver and I fell asleep, though not so Deering. As usual, our hammocks were slung in parallel lines under the tent, mine in the centre. Deering, the only one awake, fancied he heard footsteps unpleasantly close to our camp, was just on the point of awaking me, when a branch cracked, as if an animal had trod on it; some heavy body jumped over him, just striking his hammock's edge; the same moment I was struck a tremendous blow on the hip, capsized out of the hammock, and found myself rolling on the ground, trying to extricate myself from my blanket, with every body awake, and holloaing out "Tiger!" The noise frightened the brute off; he had evidently made a miscalculation, luckily for me, and instead of alighting on top of me with his claws, jumped a little low, and struck me with his head. We heard the brute and some companions softly walking round us all night, and were uncommonly glad when daylight appeared.

Leaving all our provisions, except enough for one scanty meal, with Mr. Deering, we commended ourselves to Providence,

and started on our hazardous voyage on Sunday morning, the 5th May.

At first we glided down the river calmly enough, the men pushing our raft along with their "polancas;" but after about a couple of hours we came on rocks and rapids, over which the raft could not be passed, but had to be taken laboriously to pieces, and pulled over stick by stick. While this operation was being performed we saw a jaguar of an extraordinary size, fully as large as a Bengal tiger, cross a small tributary running into the river on the right, and make towards us. The raft was fortunately ready for embarkation again; so we deprived our friend—who I believe would have attacked the whole party—of the chance of a meal. I must here note that, like all else, our bullets had long since been expended, and it would have been foolhardiness to court a contest with such a brute against B.B. shot.

During this day no less than five rapids were passed, and so laborious was the work of taking to pieces and putting together the raft, that we travelled scarcely more than 2 miles. The river was a succession of long pools, 15 to 20 feet deep, and about 150 feet wide, with scarcely a perceptible current, connected sometimes by rapids, with gravelly bottom strewn with boulders, and at others by crevasses in the basaltic rocks, in which the water would be confined in narrow, tortuous, and grimly black passages, down which it rushed boiling and frothing to another silent pool.

At the head of one of these romantic chasms we camped the first night. The wild animals always use these contractions of the river for crossings, as they can jump from one rock to the other without entering the water. So many jaguars and tapirs, who have a peculiar penchant for trampling out fires, surrounded us during the night, that we had to keep watch turn by turn for fear of an attack, while those not on duty, having left their hammocks behind, would seek the most comfortable holes in the rocks and curl themselves up to sleep until their turn for watching arrived.

The 7th, Tuesday, dawned on us, and yet no signs of the party we were in search of. Still rapids and pools alternately presented themselves, and so frequently came the former, that more than three quarters of the day we were up to our waists in the water, passing our "Mountain Mahoe" sticks down them. An iguana furnished breakfast for us again, and after eating it, resuming our voyage, we floated down a long beautiful stretch of the tranquil waters of the river. On a sudden, turning a sharp corner, a cheer burst from all our lips. There, less than 200 yards ahead of us, on a prominent rock jutting out into the river, was Captain Pim, accompanied by

Charles, the "Boss" of my 1863 expedition, and another Creole, who represented my provisioning party. The Atlantic and Pacific were at last united, and all our anxieties were at rest.

After the first joy of meeting had subsided, on inquiry I found that the bulk of our provisions had been left outside the bar of the Rama, in a sheltered nook, called Grindstone Bay, as the sea was running too high at the time to admit of a safe entrance for a loaded canoe.

Collecting together all the party had brought up with them, I sent some men back to Mr. Deering to inform him of our success and stay his further progress down the river.

I then continued the descent of the river, and, following the party to where their canoes had been left, we came on the grandest falls yet seen. I had often heard rumours from the natives of the "Big Falls," just above the junction of the north and south branches, and of their terrible nature, but until then had set down much to their fondness for exaggeration. But I was rapidly undeceived, and understood how easily the superstitious feelings of the Indians would be worked on by the sight that now met my eyes. The river running its placid course between low banks covered with "scutch"-grass, wild plantains, tree-ferns, and the venerable spreading Indian fig-tree, clothed with a matting of creepers (*Bauhinias*), and vines falling down over the water from their overhanging branches, like a curtain, suddenly changed; a great upheaval of volcanic rock, which had evidently, by damming the river, formed the long deep pool above, barred its progress, but opened a narrow winding passage, down which the water rushed for over half a mile, and dashing up against the caverns it had hollowed underneath, often obstructed in its course by immense masses of rock hurled by some convulsions of nature into the stream, sent for miles an ominous sound like confined thunder. The rocks bare of vegetation, and frowning up black and perpendicular from the waters, completed the weird contrast of the picture.

The following day, the 8th, we arrived at Rama Station, an old Indian village, my former starting-point. We then continued our voyage as far as the first inhabited Indian village. The chief, who had assumed the name of "Shepherd," soon recognised me and held out the right hand of fellowship. This man is about the finest Indian I ever met; a Rama, though perhaps hardly pure, as he has a slight moustache, but preserving all the other characteristics, clean shining brown skin, height fully 6 feet (though from his immense breadth and muscular power he seemed much shorter), with an intelligent expression and severe and determined countenance.

He soon stirred up his wife, who, according to their rigid laws, may not speak to any one out of the tribe, and ordered her to prepare some "mishla" for us, but, at my request, without the chewing process. This *mishla* is a drink prepared in a similar manner to the "kava" of the South Sea Islands out of cassada (*Jatropha manihot*), ripe plantains, pine-apples, and cocoa-nuts.

Captain Pim and Mr. Oliver shortly after went down the river with my men, intending to send the provisions up to me, and then proceed to Greytown for more. I spent the night with my friend Shepherd, who made me a lot of presents; among others, a fine bow and arrows, the former made from the soupar palm (*Guilielma speciosa*), the latter from the dry stalks of the sugar-cane (*Saccharum officinarum*) blossom, tipped with an exceedingly hard wood, called "ouka."

On Saturday, the 11th, I started up the river again with my provisions, which had arrived early in the morning. In the evening we reached Mr. Deering's camp, and soon settled our morrow's work.

Our great anxiety now was to reach Rama Station, and thus complete the work before the rains came on, which swell the streams so as to render them impassable and fill the undrained valleys with water. They are always expected about the end of May or first days of June, and we had only sixteen working days left in the month, with a distance of $16\frac{1}{2}$ miles still to cut.

We, therefore, all put our whole energies into the work, and had proceeded so far that on Saturday, the 18th, camp was moved below the "Big Falls," but, unfortunately for us, our line did not come close to it; on leaving off in the evening we had, therefore, to follow the course of a small stream until it emptied into the river, and then wading down as far as we could, were finally obliged to stop on account of the darkness and depth of the water. Swimming would have been madness, as the water was swarming with alligators and crocodiles (*Molinia Americana*); and, had we escaped them, in all probability we should have been dashed to pieces over some of the numerous falls and rapids. Night coming on, we lay down in our wet garments on a flat rock, and most of us fell asleep; but about one in the morning a halloo awoke us, and there was Charles with a canoe and lantern, come in search of the missing wanderers.

On Friday, 24th, having given the cutting party, which was now abreast of the junction of south and north branch of the river, their direction, I explored the former in a canoe with Charles and roughly surveyed its course for a few miles. It seemed to contain about the same volume of water as the northern branch, but to be a

calmer and less turbulent stream. Its course as far as I went was nearly due south, but I do not estimate its length as very considerable, for, if so, it would soon reach the watershed of the "Rio Indio." At its junction with the main stream was an old plantation, with a fair supply of plantains and bananas, and a little further south we discovered on the banks of the river part of an old "rubbing stone" used by Indians and Spaniards for preparing chocolate. Higher than this I feel assured that no Indian has ever penetrated, but that, terrified as now by the sight and sound of the "Big Falls," the numerous race which must once have peopled this river contented themselves with the tranquil waters of the lower Rama, where they could paddle their canoes in safety, and that we were the first who had penetrated through these sombre forests, from lake to ocean.

The rains were now commencing to set in, and the average of fine weather was not more than two hours a day; the warm steam arising from the hot deluged ground penetrated our instruments and tried our patience while using them to the utmost.

On Monday, the 27th, we crossed the mouth of "Charles Creek," 55½ miles from San Miguelito. This creek crossed Mr. Salmon's former line; but I am inclined to think he must have kept too much to the north, as Cauty kept too much to the south: we certainly, keeping between both, hit the right point.

We moved out camp on Thursday, the 30th, to "Duck Island," in the middle of the river, facing a grand range of hills running down from the northward to within a quarter of a mile of the river.

At 1:40 P.M. on Monday, June 3rd, we cut out at last to Rama Station, and on Wednesday Mr. Deering brought his levels to a termination, and our last and 37th benchmark was cut and engraved at a distance of 61 miles 854 yards from San Miguelito, and a height of 115·17 feet above the mean level of the Atlantic at Pim's Bay. The afternoon of that day I occupied in exploring the creek opposite Rama Station, but I soon found it contract so much as to render the progress of a canoe difficult. At its apex with the Rama River were the ruins of an old Indian village, with curious carvings of figures on the trees.

The next day we all started down the river on our homeward way, stopped at Shepherd's to pay him a farewell visit, and after killing a mountain cow and some wari we arrived at "Tincum's Village," at the mouth of the Rama, at 6 o'clock the next morning, cold and drenched through with the incessant rains.

Hastily swallowing a cup of coffee, we started off for the bar, knowing the necessity of crossing it as soon as possible, for fear of one of the gales which often occur at that season of the year arising

and stopping our progress. To my intense disappointment the bar was declared impracticable, there being three distinct lines of breakers, one outside the other; two were the limit, my men said, they could cross in safety.

Tincum's village, a collection of about twenty huts, was certainly a model Indian settlement, the huts were all beautifully built of stout posts of lancewood (*Duguetia Quitarensis*), filled in with the tough "sillico" stems, and roofed with the leaves of the swamp-growing "scumfra." They were incomparably superior to the wretched Spanish hovels of San Miguelito, and showed strongly the superiority of the pure Indian over the mongrel descendents of his race and the Spanish conquerors. The hatred of the Ramas for the Spaniards was intense, and only the friendly feeling of the former towards me saved the latter from destruction. Before parting, Shepherd gave the Spaniards a hint that if they ever came to his country alone, he would have the greatest pleasure in killing them all. The statement was made in such a serious matter-of-fact way that I could not help laughing; but the poor Spaniards, gazing on the giant's proportions, evidently did not feel safe or happy until they had left him some way behind.

On Wednesday, in spite of my men's warning of the still dangerous appearance of the bar, my patience was exhausted, and I determined to try it; packing our canoes we steered steadily for it, and watching our opportunity darted over with a slight ducking, but in perfect safety. That evening we slept at "Great Grindstone Bay," as the men feared the Greytown bar at night. Sandflies innumerable bit us during our hasty sleep. At 11 P.M. we re-embarked, had plenty of rain, and arrived at Greytown over a tranquil bar at half-past 8 next morning. So ragged and wet and worn, without shoes or stockings which had long since quitted us, were we on arriving that the honest people hardly knew us; but a good sleep, wash, and decent clothes, soon put us to rights. Our health, notwithstanding all hardships, had never been better, and when we embarked in the *San Francisco* for New York, on the 22nd of June, we could safely say that having tested the climate of Nicaragua and Mosquito in its worst aspects, it had not hurt us.

The results attained by this expedition are important. The penetration across from the lake to the Atlantic, with a summit-level of only 619·86 feet above the former, does away with all the fears that previously existed of there being inaccessible and lofty mountain ranges to bar the construction of a railway. Taken as a broad fact, the only range of importance, the Cordilleras, which in other parts of the isthmus forms so impassable an obstacle to railway construc-

tion, has here by a freak of nature, with the exception of a few of its highest peaks, been obliterated and covered up by Lakes Managua and Nicaragua, down which its central line runs.

Before, however, reaching the northernmost lake, the Cordilleras shoot out two subsidiary ranges, one on each side, which enclose and form the watersheds of the two lakes. In the range running down between these lakes and the Pacific Ocean, a pass at the height of 615 feet has been discovered; while in the other range an almost similar altitude of 620 feet has been disclosed by my recent surveys.

The two secondary ranges running north and south have, in their turn, numerous spurs, between which the rains make their channels and flow off west and east, as in the case of the Tule and Rama rivers.

Another point of importance—the question of impassable swamps—has been set at rest: absolutely none exist. The only signs of marshy ground we discovered was on the margin of the lake, where in some places the low-lying parts of the savannahs are almost below the water-level; but as these parts, forming “*esteros*” in the wet season, lie between low hills of 50 to 100 feet in height, running east and west in the natural drainage direction of the country, they can be avoided entirely.

A great deal might be written of much interest on the geological features of the country, but time will not allow me to do more than indicate them. The parent and secondary ranges of the Cordilleras are volcanic; and though to the north of Lake Nicaragua and between that lake and the Pacific much good limestone exists, on our course between the Lake and Monkey Point, with the exception of sandstone, the rocks wherever apparent were always volcanic,—basalt, porphyry, and tufa overlying entirely the former strata.

These volcanic rocks, except on the tops of the hills, are covered with a subsoil of yellowish earth, formed by their own degradation, taking in places the consistency of clay, and in the deeper valleys forming a soft conglomerate with large masses of flint imbedded.

In its turn this subsoil is covered by rich loam formed of decayed roots and vegetable matter, which watered by the tropical showers is astonishingly fertile.

In conclusion, let me observe that this expedition—undertaken without adequate means or time, dreading the approach of the rainy season if it relaxed its eager speed for one moment—was naturally imperfect, and will necessitate more searching and leisurely surveys before the best and most economical route can be ascertained; but it has succeeded in its grand object by demonstrating not only the

practicability, but also the advisability of the route for a Transit, and has laid the basis for all further examinations by having good and durable bench-marks cut along the line at short intervals, with their heights and distances from lake and ocean accurately measured and recorded.

APPENDIX.

WOOLWA VOCABULARY.

Libra.	Woolwa people.	Ahmakouting.	Sleeping.
Wahi.	Brother.	Meouhka ahma-	To sleep.
Al.	Man.	kouting.	
Yel.	Woman.	Toonik.	Head.
Sirou backar.	Girl.	Tas.	Cloth to wear
Al backar.	Boy.		round the loins.
Backar.	Young.	Kalki.	Foot.
Yalki.	Wife.	Kinki.	Hand.
Alkimuk.	Husband.	Wakki.	Plantains.
Pamki.	Tapir.	Inkkini.	Bananas.
Nowarpowka.	Red tiger.	Um.	Corn.
Powka.	Red.	Sussunka.	Beads.
Nowar.	Tiger.	Simming.	Fish-hooks.
Nowar bulka.	Spotted tiger.	Sooksuwookka.	Cord.
Nowar burruska.	Black tiger.	Asnar.	Cloth.
Bulka.	Spotted.	Soobba.	Pot.
Burruska.	Black.	Watikah.	Banana bird.
Pichea.	White.	Vecah.	Hare.
Sunna.	Deer.	Kee.	Rock.
Sowie.	Wari.	Sou.	Ground.
Cassi.	To eat.	Souassung.	World.
Caskouting.	Eating.	Nowal.	Devil.
Deekoting.	Drinking.	Waikou.	A god.
Soopokoting.	Sucking.	Mah.	Sun.
Deeko.	To drink.	Waikoo.	Moon.
Yappoo.	Alligator.	Mahbruska.	Sky.
Kahama.	Iguana.	Waslouti.	Rain.
Was.	Water.	Ewi.	To die.
I warra.	Come here.	Yowahkooting.	To walk.
Baina warra.	Come here quick.	Yoolbutiang.	To talk.
Yowanakou.	Let us go.	Mahdi.	To-day.
Koorring.	Canoe.	Yun.	To-morrow.
Wahinah.	Paddle.	Dummi.	Yesterday.
Koobil.	Knife.	Koo.	Fire.
Seeban.	Bow and arrows.	Koolaka.	Firewood.
Keeddak.	Axe.	Pun.	Wood.
Oorrus.	Monkey.	Quassika.	Hammock.
Wummi.	Curassow.	Keettung.	Waterfall.
Wunkuruman.	Guan.	Tookwunnah.	Big.
Woomalo.	Partridge.	Was.	River.
Moolakoos.	Peccary.	Tooki.	Mouth.
Yamka.	Good.	Meekduka.	Eyes.
Dootka.	Bad.	Anaki.	Teeth.
Awai.	Yes.	Tapahki.	Ears.
Aissou.	None.	Bas.	Hair.
Eessou.	No.	Ki.	Mine.

Yungdeeki.	Yours.	Waya hal.	Mosquito man.
Washbiloo.	Mishla.	Waya yel.	,, woman.
Moohiwah deekana.	His.	Souhtuk.	Calabash.
Amiseeka.	Sister.	Mahbootoring.	Fighting.
Passingka.	Father.	Koomah.	Salt.
Mamaka.	Mother.	Koomhoo.	Rabbit.
Kahaloo.	Shirt.	Backar kee.	Children.
Kahasong.	Trowsers.	Oo.	House.
Cococo.	Cocoa-nut.	Assun.	Hill.
Almuk.	Male.		
Tooroo.	Cattle.	Aslar.	One.
Pamka.	Horse.	Bou.	Two.
Boorroo.	Donkey.	Bas.	Three.
Mulah.	Mule.	Aroonca.	Four.
Malakah.	Indian rabbit.	Seenca.	Five.
Kookmik.	Armadoillo.	Deeeca.	Six.
Hoombooka.	Bird.	Yeeca.	Seven.
Ooli.	Turtle.	Bachca.	Eight.
Taspool.	India-rubber.	Tingnicaslar.	Nine.
Deehlatookuting.	Cooking.	Tingniskoobou.	Ten.
Pun.	Tree.		

MOSQUITO VOCABULARY.

Narra bal.	Come here.	Pies.	Eat.
Eine.	Make haste.	Ploom.	Victuals.
Kaiser.	Let us go.	Dies.	Drink.
Douce.	Stick.	Lia.	Water.
Yerri.	Long.	Lia Kowta.	Cold water.
Clucki.	Cut.	Wano.	Come along.
Brebal.	Bring it here.	Apia.	No.
Yany.	Mine.	Aou.	Yes.
Man.	Your.	Yabra.	North.
Eisiken.	Father.	Blanco.	South.
Yapti.	Mother.	N'emopera.	Go this side.
Mooin.	Eldest brother.	Passer.	Wind.
Deevra.	Youngest brother.	Keero.	Knife.
Lakreka.	Sister.	Rakboos.	Gun.
Tahte.	Uncle.		
Yapti deevra.	Aunt.	Kumi.	One.
Damer.	Grandfather.	Wal.	Two.
Kookah.	Grandmother.	Yumpa.	Three.
Pearker.	Widow.	Walwalun.	Four.
Mair.	Wife.	Matasip.	Five.
Mair waikna.	Husband.	Mata walkaby.	Six.
Mairen.	Woman.	Mata walkabykumi.	Seven.
Waikna.	Man.	Matawal wal.	Eight.
Lilla.	Mistress.	Matawal yumpa.	Nine.
Almuks.	Old man.	Matawal sip.	Ten.
Hupla.	People.	Youan eiske.	Twenty.
Mehi.	Friends.	Youan eiske wal.	Forty.

The PRESIDENT said, as Englishmen they must all be proud of Mr. Collinson, a civil engineer who had shown so much skill and perseverance in surmounting the difficulties of this original survey of a wild country, and had laid before them geographical data of considerable importance. He would first call upon Captain Bedford Pim, who was the original projector of this traverse of the isthmus, and who had previously distinguished himself by his researches in the Arctic regions.

Captain BEDFORD PIM said the able paper of Mr. Collinson left him hardly scope for saying a word upon the subject. There was one point it might be

desirable to mention, which was, that Mr. Collinson's feat was absolutely the first spirit-level survey across Central America, with the exception of that undertaken for the Panama Railway. He had great pleasure in bearing testimony to the ability of Mr. Collinson. Few people were aware of the amount of hardship and difficulty met with in cutting through the dense forests of Nicaragua. Mr. Collinson surmounted every obstacle with a degree of bravery and perseverance which deserved high praise, and had it not been for his great exertions he (Capt. Pim) should have had to return to England for the third time disappointed in opening up this hitherto unknown tract of country. Lieutenant Oliver of the Royal Artillery, already well and favourably known to this Society, was also entitled to much credit for the able manner in which he assisted Mr. Collinson, in the traverse from the lake to the shores of the Atlantic.

Captain MAURY (U.S.), after acknowledging the great services which Captain Pim had rendered to the commerce of the world by projecting and carrying out the Nicaragua route, observed that he had rendered no less a service to geographical science. He and his able assistants had made us acquainted with the geography of these regions, and given us an amount of information which we never possessed before. He (Captain Maury) was of opinion that the Nicaragua route would be preferable to the Panama one for crossing to the Pacific. All that country was liable to what are called periodical rains. A belt of cloud might be considered as extending in these latitudes from the coast of Africa across the Atlantic to the shores of America. This cloud-belt moved from north to south with the sun in declination. It went as far south as lat. 3°. When it came north it passed over Panama and Mexico, and was the source of the periodical rains in those regions. But the effect was the annual occurrence of a long period of calm in the Pacific near Panama, which rendered that part difficult of access by sailing vessels, an objection which did not apply to the ports of Nicaragua, where these calms are unknown. When he was in Mexico two years ago he had the honour of calling the attention of the Emperor Maximilian to the subject of investigating the phenomena of this cloud-belt, with its accompanying rainy season. His Majesty, with that enlightenment which was his characteristic, authorised him to procure instruments from London, with a view to the establishment of not less than 62 meteorological observatories in Mexico, which were placed under the direction of the Geographical Society of that country. He was surprised to find this Mexican Society in so flourishing a condition. For many years, notwithstanding the revolutions in that country, it had been pursuing its quiet work, publishing its journals from time to time, and holding regularly its meetings. He could not tell what had become of the instruments; but he thought it was worthy the attention of the Council of the Royal Geographical Society of London whether they would not open a correspondence with the Mexican Society, with the view of obtaining from them the observations which these instruments were sent to procure.

Admiral Sir EDWARD BELCHER said, perhaps as surveyor of the whole of the Pacific coast of Central America, a word from him might not be unimportant. He questioned if any of the persons who had spoken had any personal knowledge of that coast, or of the climate, the winds, or the facility of travelling along the coast. When he was there he never had any difficulty in getting in and out of the Bay of Panama. He was glad to hear that a route had been surveyed across Nicaragua, but he thought the proposed line started from an awkward part of the coast on the Atlantic or eastern side, where there was great difficulty in effecting a landing. It would not be easy to find anchorage for ships; neither was there any harbour on the opposite or Pacific side; and the frequent gales of wind on that coast termed Papagayos would dismast any ship that attempted to approach it from seaward under canvas. A little to

the southward there was a splendid harbour, perfectly free from gales. If the party had run their line further to the south-west, through Costa Rica, they would have found a fine country. On the other hand, in the Bay of Honduras, a line had been examined by Mr. Squiers, many years ago, and found to be practicable; while the Gulf of Fonseca to the southward, where that line terminates, would contain the whole navy of England. On these accounts he would have preferred a more northerly line through Honduras,—a country infinitely richer in every way than Nicaragua, with a better climate, and perfectly free from those insect pests which were found further south. With respect to the communication between Colon and Panama, he never heard till this evening that there was any difficulty in landing at Colon; and on the Panama side, from 1837 to 1840, he was in the habit of sending the *Starling* tender under Captain Kellett backwards and forwards with despatches, with such certainty that he knew almost to a day when he would arrive. All the accounts about the difficulties of the Bay of Panama he could not comprehend, for he never experienced bad weather or a gale of wind there in his life.

Commander PEACOCK said he had surveyed the coast of Nicaragua as far back as 1831, and had the honour of discovering that the coast-line had been laid down 58 miles of longitude in error on all the maps and charts previous to that time, which was afterwards verified by Capt. Owens, R.N., in H.M. surveying ship *Blossom* in 1832, as the discovery was considered so important that the Commander-in-Chief ordered this ship to proceed to the Mosquito coast on purpose to ascertain the truth of this extraordinary error, which had remained for upwards of *three centuries* in all the maps and charts of the world. This coast was discovered by the immortal Columbus in the month of September, 1502, when on his fourth voyage. Mr. Peacock had also had the honour of surveying the Isthmus of Panama from ocean to ocean, and of commanding the first steamship that ever visited Panama, in February, 1842. He also had the honour of calling attention in 1831 to the route across Lake Nicaragua by steamers of light draft and by railway to St. Juan del Sur, and his letter on the subject would be found in the archives of the Admiralty, with this comment—"should the west coast of Nicaragua be laid down correctly, the eastern coast being so much in error, the distance across to the Pacific would, by this singular discovery, be 60 miles shorter than hitherto supposed by geographers." Mr. Shepherd told him that he had taken a schooner drawing 6 feet of water up the Colorado branch of the river to Lake Nicaragua; and also that the ground between the lake and St. Juan del Sur was very easy for carrying a railway across. He (Mr. Peacock) had also explored the river St. Juan to its junction with the Colorado branch, and could endorse all that Mr. Collinson had stated in the able and interesting paper they had had the pleasure of listening to, in respect of climate and the numbers of jaguars, alligators, &c., met with in the jungle and on the banks of the rivers on that coast. In the letter he had had the honour of addressing to Admiral Colpoys in November 1831, he named an excellent suggestion of Mr. Shepherd's, viz., that if the Colorado branch of the St. Juan were to be dammed across, at its confluence with the latter, falling into the harbour of St. Juan, he believed it would scour a deep water-channel from thence into the harbour, and enable vessels of some draft to ascend at once to the lake. With respect to the remark made by Mr. Collinson as to large vessels having been said to have ascended the St. Juan in the early voyages of the Spaniards, it is not improbable that the Colorado branch may be comparatively of recent origin, which would account for the shallow condition of the St. Juan itself at this time, for the hydrographical changes that have taken place ever since 1831, by the growing out of Point Arenas upwards of $1\frac{1}{2}$ mile in length in less than 30 years, is one of the most remarkable changes, by natural causes, known; for what was a good harbour from 1831 to 1857, with anchorage for a fleet of large ships, having deep water on both sides of

this natural dyke, became converted into a lagoon in 1859, by the spit joining the mainland—soon after which the harbour was shut up.* Capt. Freeman, of the sloop *Countess of Belmore*, employed in the shell-turtle fishery on that coast, told Capt. Peacock that rich mines of gold and silver existed a few days' journey inland from Blewfields to the northward of St. Juan, which doubtless were those now known as the Chontales mines.

Dr. SEEMANN would speak as to the feeders of the projected railway; he had twice explored the greater part of Nicaragua under the direction of Captain Pim. His route lay from Leon north-eastwards. After leaving Leon, and for four or five days' journey, the climate gradually became delightfully fine. He went up as far as the boundary of Honduras, and found there extensive mining operations going on, the ore being chiefly of silver. He then went southward to Chontales, the new gold region, which had been brought into notice by Captain Pim. The climate of the Pacific side of Nicaragua is comparatively dry, and the rainy season short. After passing to the east of the lake the rainy season becomes prolonged several months, the rains continuing till February, while in other parts they cease in November. The vegetation on the Pacific side is similar to that near Panama; but at Chontales it is much more luxuriant, and the timber there is finer than it is on the Pacific side. The whole of the Chontales forest is a virgin forest. At his suggestion a meeting had lately been held in Chontales to ascertain the possibility of cutting a route from Chontales to the Blewfields settlement. He had found that several people had made their way to the coast; and he was glad to say that a route was now being cut under the direction of Colonel Maury, and by order of the Javali Company.

Mr. J. H. MURCHISON observed that Admiral Belcher, while speaking of the Honduras route, had forgotten that no proper survey had been made across Honduras; whilst at Nicaragua a most elaborate and able survey had been carried out. More than that, a transit route had already been in operation across Nicaragua to St. Juan del Sur. Another circumstance in favour of the route proposed by Mr. Collinson was that the United States Government, about two years ago, had sent a staff of engineers to survey the Atlantic coast of Central America, under the charge of Captain West, who, after pronouncing the harbour of Grey Town impracticable, and making a special survey of the harbour at Monkey Point, had stated that this was the harbour on the Atlantic which could be made the most practicable for commercial purposes. Again, the climate was finer than at the Isthmus of Panamá, and the distance from New York and Liverpool to San Francisco, by the Nicaragua route, was considerably shorter than by the Panamá or the Honduras route.

The BISHOP of HONOLULU said he had made several transits over the Isthmus of Panamá, and could not concur in the ground taken by the advocates of the Nicaragua route, viz., that the one over Panamá was unhealthy. In 1862 he stayed most part of a week there with his wife and children, and two clergymen with their families, and they found the place healthy, and suffered no inconvenience. The intelligent Consul there, Mr. Henderson, had often said, as a *tropical* climate, that of Panama city was one of the very best, and that he enjoyed there very good health. At Aspinwall or Colon, on the Atlantic side, the manager of the railway, who had had an experience of above ten years' residence there, with his family, said, "if a person took the proper precautions usual in the tropics, and was careful about stimulants, for example, he might live as long there as anywhere else." The chaplain had told him (the Bishop) the same. He mentioned these facts in vindication of the

* See Plan of Port St. Juan surveyed by Mr. Peacock in 1831, with the gradual growth of the spit from year to year up to December, 1858, in the Map Collection of the Royal Geographical Society.

Panamá railway route, from whose managers he (the Bishop) had ever received much personal kindness and attention.

Admiral OMMANNEY said he was stationed off the coast of Central America in command of H.M.S. *Brunswick*, 80 guns, for five months, most of that time lying off Colon, and could confirm all that the Bishop had just said as to the salubrity of Colon and the advantages of the Panamá railway. The climate of that locality when the railway was first commenced was in bad repute; since then it had improved, owing to the clearance of timber and vegetation along a belt of country on each side of the line, through the dense virgin forest which covers the Isthmus: the prevailing wind which blows from the N.E. direct from the sea over Colon renders that place healthy. His ship's company, consisting of upwards of 800 persons, enjoyed good health; he had the satisfaction to leave the station without the loss of a man by death from the climate. The present survey of Nicaragua, with regard to opening out an access into that country, was a good work accomplished, and reflected very great credit on those who had conquered the difficulties and privations; any work tending to develop the natural sources of wealth in Central America was a benefit to mankind. The proposed line as a means of interoceanic communication between the Atlantic and Pacific would be of little value unless there were good ports at each terminus capable of receiving the largest passenger ships: on this point he was sceptical. He had visited the Mosquito coast, and feared that no harbour existed at Monkey Point suitable for the object. He considered it a dangerous coast and subject to boisterous weather; he was once caught off Monkey Point on a lee-shore with a heavy gale, in a line-of-battle-ship; had difficulty to work off under storm-sails, aided by steam-power, against the heavy sea rolling along the coast. The advantage of the short transit by the existing Panamá line, which has good towns at each terminus, would command the preference for passengers to the more lengthened route by the proposed scheme.

Mr. COLLINSON, in reply, adverted only to one point—the harbour at Monkey Point. He had had considerable experience of that harbour as to shelter. In 1863, in one of the most violent northers on that coast, he was for three days, in that harbour, in one of the Royal Mail steamers, and was completely sheltered. On the contrary, at Colon, during one of these northers, the Royal Mail steamer *Avon* was blown right on shore against the landing stage, which was entirely destroyed. She could not get out with full steam on.

The meeting then adjourned.

Third Meeting, December 9th, 1867.

SIR RODERICK I. MURCHISON, BART., K.C.B., PRESIDENT, in the Chair.

PRESENTATIONS.—*Rev. A. Raleigh, D.D.; Edward Spicer, Esq.; J. H. Tritton, Esq.*

ELECTIONS.—*Frederick Shirley de Carteret Bisson, Esq. (Lieut. R.I. Militia); James Chapman, Esq.; Andrew Halley Knight, Esq.; William McArthur, Esq.; Hon. John McLean, Esq.; Richard Ramsden, Esq., B.A. Trin. Coll., Cambridge.*

ACCESSIONS TO THE LIBRARY, from NOVEMBER 25TH to DECEMBER 9TH.
—*Voyage sur le Coté Orientale de la Mer Rouge dans le pays*

d'Adal et le Royaume de Choa,' par C. G. K. Rochet d'Héricourt, 1841. Purchased. 'Travels in Nubia, Egypt, Holy Land, Mount Lebanon, and Cyprus, in the year 1814,' by Henry Light, 1818. Purchased. 'Question d'Abyssinie au Peuple de la Grande Bretagne,' par J. Cozzika: Constantinople, 1867. Presented by the Author. 'Generall Historie of the Turkes,' etc., by Richard Knolles, 1603. Purchased. 'Voyages dans l'Inde par le Prince Alexis Soltykoff:' Paris. Purchased. 'The Birds of South Africa,' a descriptive catalogue of, by Edgar L. Layard: Cape Town, 1867. Presented by G. Frere, Esq. 'Climate and Meteorology (Physical and Medical) of the West Coast of Africa, with Hints to Europeans for the preservation of Health in the Tropics,' by James Africanus B. Horton, Esq., M.D., 1867. Presented by the Author. 'The Itineraries of William Wey, Fellow of Eton College, to Jerusalem, A.D. 1458 and 1462; and to St. James of Compostella, A.D. 1456,' from the original MS. in the Bodleian Library, 2 vols. Presented by the Earl of Powis. 'South Atlantic Ocean: a Sailing Directory for the Ethiopic or South Atlantic Ocean, including the Coast of South Africa,' 5th edition, by A. G. Findlay, Esq. Presented by the Author. 'The Art of Travel; or Shifts and Contrivances available in Wild Countries,' by Francis Galton, Esq. 3rd edition. Presented by the Author. A small Miniature in marble, by Taffe, of John Pinkerton, Geographer, dated 1798. Presented by J. W. Lowry, Esq.

ACCESSIONS TO THE MAP ROOM SINCE THE LAST MEETING, NOV. 25TH.—Switzerland: Eastern part of the Canton of Grisons, showing the Glaciers of the Lower Engadine, on 2 sheets, by J. M. Ziegler, Corresponding Member. Presented by the Author. Ditto: a Geological Map, by M. B. Studer and A. Escher, on 4 sheets. Compiled and presented by J. M. Ziegler. Ancient Map of Egypt, Nubia, and Abyssinia, and Sources of the Nile, from Sebastian Munster, 1550. Presented by Dr. T. Murie. Atlases:—A Pictorial Atlas of the Victoria Falls, Zambesi River, sketched on the spot by T. Baines, Esq., containing 11 chromo-lithographic engravings; also 44 photographs of South African scenery. Presented by the Author.—Hydrographical Atlas of the Rio das Velhas, a tributary of the Rio San Francisco, South America. Purchased.—The Handy Royal Atlas, by A. K. Johnston. Presented by the Author.—Missionary Atlas of South Africa, by Dr. R. Grundemann. Presented by the Author.

The PRESIDENT announced that since the last meeting he had received letters of the most satisfactory description respecting the "white traveller" seen in the interior of Africa, whom many persons, himself included, were disposed to think could be no other than Dr. Livingstone. The letters were, in his opinion, singularly corroborative of the hopes which the former tidings had excited. It would be remembered that the news of a white man in the inte-

rior was communicated to Dr. Kirk at Zanzibar by a native who had served in a trader's caravan, and who had stated that the leader of the caravan, and other men belonging to it, were at Bagamoyo on the mainland, where they might be seen and questioned on the subject. Since then Dr. Kirk and Mr. Churchill had been to Bagamoyo and seen these men, and the result was communicated in these letters. The first letter was from Mrs. Kirk to himself :—

“Zanzibar, Oct. 11, 1867.

“The white traveller, concerning whom Dr. Kirk wrote to you on the 28th of last month, according to further accounts, stayed five days at the village where the caravan was, and then went on to the next chief. The white man was of moderate height, not stout, wore a white coat and trousers, and a black cloth cap, round which he sometimes wrapped a white cloth. He gave the chief a looking-glass, eight yards of flannel, and a tin box. He went on northwards. He gave a letter to Bunduki, the leader of another caravan, which is expected on the coast in a month. He had a compass and other instruments which he used at night. He could converse in Suaheli, but did so imperfectly, and with the Nyassa idiom, ‘like Dr. Kirk.’ He had a beard; three of his party carried boxes, four had bags of beads, the others miscellaneous articles. This is all the information we have, and Dr. Kirk wishes me to tell you he has hardly any doubt at all that it is indeed Dr. Livingstone. If it is not, who can it be? There is no other white man in the interior that we know of, and a Portuguese from the west would not speak Suaheli. There is also a rumour that a white man has been seen in the country of Uruwa, west of Ujiji, but as yet we have not been able to trace the report. It was heard casually mentioned in a conversation between two natives. Dr. Kirk sent a large parcel of guns, letters and other things to Ujiji to meet Dr. Livingstone, who, if he hears in any way that such things lie there for him, it would probably influence his movements.

“P.S.—Mr. Brenner, the companion of the late Baron von der Decken, is just returned to Zanzibar from the River Dana, which he has ascended for a distance of between 100 and 200 miles from the sea. He describes the river as deep and navigable for small craft, and it flows through a rich country.

“HELEN KIRK.”

Hitherto Dr. Kirk, as the meeting was aware, had been an unbeliever in the existence of Livingstone, in consequence of the impression made upon his mind by the story of Moosa. It would be seen that he had now changed his opinion, and come round to the view which he (the President) had long ago expressed.

The other letter was to Mr. Webb from Dr. Kirk himself :—

“Zanzibar, Oct. 9, 1867.

“The interesting discovery that a white man had been seen seven months ago to the south of Lake Tanganyika, induced Mr. Churchill the Consul, and myself, to go to Bagamoyo, a place on the coast, the point of arrival and departure of the Ujiji caravans. The result of our visit has been to find two other men who also saw the wanderer in the interior, at Marungu, and to place his existence apparently beyond doubt. We have also learned something about his personal appearance, his escort, and the route he was taking, and have been told that letters were given to one of the head-men of another caravan that was at Marungu. This man, we have since been told, is a well-known man; so that on his arrival from the interior, expected in the course of a month, we may not only have our curiosity satisfied, but I sincerely hope our best wishes for our dear friend Livingstone realised. I hope we shall find that he has been successful, and is pushing his way to the Albert Nyanza, thence to emerge, *viâ* the Nile, on the Mediterranean. He will have been the first man

who has not only crossed the continent, but has passed through the whole length of Africa, from the Cape of Good Hope to the mouth of the Nile. But the essential part of his work will have been done before he reaches the Nile, and he may safely return towards Zanzibar, if so minded, with laurels sufficient to constitute him the greatest of all explorers, and the African traveller *par excellence*. You see I am very sanguine that our friend is still alive. The manner in which we obtained the testimony was very satisfactory. In the first place, I picked up the news amongst the native traders. I then addressed the caravan people, and drew out their story while they were unsuspecting of its interest; so that neither Hurdee traders nor Suaheli men had an object to tell lies, nor any idea of how to act if they wished merely to please. Besides, our conversations were carried on without an interpreter, and, although making no pretence to a full knowledge of the language, I knew quite sufficient to be able to express myself, and dispense with that fertile source of confusion, an interpreter. I need not repeat all we heard; most of what is important will be published before this reaches England. With the prospect of letters from Livingstone so near, we may well refrain from all speculation on the subject of his geographical discoveries.

“J. KIRK.”

The President added that on the receipt of these letters he had written to Lord Stanley, who had informed him that no despatches from Zanzibar had reached the Foreign Office at present. He had no doubt before the next meeting of the Society all these despatches would be received. He was sure there could be very few persons who would not participate in the sanguine hopes he entertained that their dear friend, Dr. Livingstone, would not only return to them, but, as Dr. Kirk said, covered with the laurels which he would have so gloriously won.

MR. JOHN CRAWFURD thought the information they had just received was somewhat more satisfactory than the former tidings. Still he confessed that he did not see in the information all the satisfaction that the President seemed to feel. He had a very high opinion of Dr. Kirk, and thought he was one of the best observers who had ever travelled in Africa; still, he must plainly say, that he was yet disposed to place considerable reliance on Moosa. There was one part of the information communicated on the former occasion on which he wished to make a remark, and that was the photograph which the native carrier was said to have recognised for Livingstone, out of several that were shown to him. Now he held it to be totally impossible for a native African, unaccustomed to pictorial representations, to pick out a particular portrait of a white man, dressed, as he represented, in European costume with a white cloth round his head.

The following Paper was then read:—

Sketch of a Journey through the Interior of China, from Canton to Hankow. By A. S. BICKMORE, Esq., M.A., Massachussetts.

THE author left Canton on the 7th August, 1866, with the intention of following a route proposed for a future railway to Hankow, *viâ* Quei-lin and the banks of the Siang affluent of the Yang-tse. Travelling up the Si-Kiang to Wu-chau, he ascended the Cassia River to Hingnan, and near that place found that this northern affluent of the Canton River was connected by an artificial canal with the great Siang River flowing northward into the Yang-tse. Being autumn,

and the season unusually dry, the upper courses of both the Cassia and the Siang were encumbered by rapids; at other times he believed it would be possible to travel from Canton, through the interior of China, to Shanghai in the same boat. Near the populous city of Quei-lin Mr. Bickmore narrowly escaped massacre at the hands of the unruly populace, notwithstanding the protection afforded him by the mandarins. The whole country had been in a state of anarchy since the Tae-ping rebellion, and even boats belonging to the Imperial Government, with mandarins on board, were frequently plundered by hordes of ruffians on the banks of the river. Henceforward his Chinese guides kept him closely confined in his boat, that he might escape observation and reach the Yang-tse in safety. The canal connecting the Yang-tse Basin with that of the Si-Kiang can only be used by boats drawing 2 feet of water. The water is kept in by dams built across wherever a rapid would occur, and allowing an escape only through a small gap, deep enough for a single boat to pass. At Sichang, on the Siang River, are situated the principal coal-mines of the region, and some fifty boats were seen loading. The mines are nothing more than deep pits in the sides of the hills, and consequently only surface-coal is obtained. It is to be expected that better coal would occur below the water-level, but as soon as the miners come to water they are obliged to abandon the mines for want of proper pumping apparatus. From Sichang to Moukden, north of Peking, there is a continued series of coal-mines on the flanks of the elevations that form the western border of the great plain. A striking spectacle was presented, on arriving at the Tung-ting Lake, at the junction of the Siang with the Yang-tse. A heavy northerly wind had been blowing for six or seven days, and few or no boats had been able to proceed. A southerly breeze then set in, and all the boats that had been harbouring in the many creeks and bays came out, and at sunrise such a sight was obtained as could only be seen in a land where the population is numbered by the hundred million. As far as the eye could reach the surface of the lake was thickly feathered with white sails, some in sunshine, some in shadow, and some in the dim distance, apparently gliding on a thin film of air above the water. Four hundred and forty boats were counted in sight at one time. The Poyang Lake, lower down the river, is of the same character. It has been noticed that these great lakes have near them a group of high mountains: this is only another way of stating that where there has been an unusual elevation there has been a corresponding depression.

This Paper will be published entire in 'Journal,' vol. xxxviii.

The PRESIDENT asked the Society to return their hearty thanks to the author of the paper,—a young American gentleman, who had accomplished a most remarkable journey. Mr. Bickmore had been a pupil of Agassiz, and had travelled in the East for scientific purposes. Leaving Boston some four years ago, he had traversed nearly the whole of the Eastern Archipelago, including the island of Sumatra, upon which it was his intention to communicate another paper to the Society at some future day. He had finished his extensive travels by making this remarkable journey through the interior of China, described in the paper, visiting Japan, and crossing Siberia on his way to Europe. He arrived in this country about a fortnight ago, and it was his intention to be present at the last meeting of the Society, to read his own paper,—one of the most interesting memoirs that had been brought before them for many years. On the eve of the meeting, however, he found that he should be obliged to leave at an early hour, in order to catch the steamer at Southampton on his return to America, and thus we had been deprived of the advantage of hearing him personally. The information in the paper was of great importance to our commercial community, because we are about, next year, to have a new treaty, and should probably have opportunities of opening out a more extensive commercial intercourse with China. Mr. Bickmore had described in the most graphic manner the desolation and barbarism of those provinces over which the Taepings had extended their devastations. That state of things, fortunately, had passed away, and we might hope that the empire of China was now recovering. Mr. Bickmore was the first European who had performed this journey *viâ* the Cassia River and the canal leading to the Siang affluent of the Yang-tse, at least we had no record of any previous traveller.

Mr. JOHN CRAUFURD said he had a great respect for the enterprising gentleman who was the author of the paper. In the course of his travels he had crossed the island of Sumatra, one of the largest in the world, and one of the least known, had visited Java and the Moluccas, and, after this remarkable journey through China, had visited Japan, the Kurile Islands, and the Russian settlements on the Amoor. He had no doubt Mr. Bickmore would publish a full account of his travels. He had shown us what a singular people the Chinese are. While the Taeping rebellion had been going on, our trade with the country had been from year to year increasing, such was the extraordinary perseverance and wonderful industry of these people. He believed our commerce with China exceeded that of other countries, American and European. It amounted to 40,000,000*l.* of annual imports, and about the same total of exports. But it would be a long time, in his opinion, before there would be any railways in China. A project had been recently brought forward for a railway from India through Burmah into China. Such a line would have to traverse, for several hundred miles, the two worst provinces in China—Yunan and Kwangsi—before it could reach those districts from which we procured the two great staples of China, tea and silk. It would be impossible to carry out the project, and he hoped the British public would not be disposed to invest their money in Chinese railways. He was happy to think that Mr. Bickmore's labours had received the approbation of the Society. He hoped to see a further paper from him, for he was sure it would be as worthy of attention as the one which had just been read.

Mr. Bickmore had sent the following letter to the President, on leaving England :—

“Hamburg Steam-ship *Borussia*, Southampton,
Nov. 26, 1867.

“MY DEAR SIR,

“I should be doing myself, and my many American friends, a great injustice, were I to leave your shores without earnestly expressing to you, and asking you to express to the honourable body of which you are the President—

and through them to the public—my deep sense of gratitude for the many kind attentions I have had the honour to receive at the hands of many of Her Majesty's officers during my travels in China and Japan.

"I am especially indebted to Vice-Admiral George King, who at that time commanded Her Majesty's fleet in those seas, for an open letter, addressed to all the captains under his orders, asking them to receive me on board and take me to such places as they might be visiting, whenever I wished to avail myself of the privilege.

"I sincerely trust that when any English gentleman is travelling within our borders, or on seas frequented by our navy, for scientific purposes, he may receive the same polite attention.

"I shall further ask you, if you deem it proper, to read this note when my paper comes before your Society, and deposit it in your archives.

"With many thanks for your personal attention during my late visit to London, and an expression of my highest consideration,

"I have the honour to be, your obedient servant,

"ALBERT S. BICKMORE."

"Sir RODERICK I. MURCHISON, Bart., President of the
Royal Geographical Society, London."

ADDITIONAL NOTICES.

(Printed by order of Council.)

1. *Extension of Electric Telegraph Lines in Queensland.*

THE various surveys which have been made during the last two years in connexion with the extension of the telegraph system in Queensland have done much towards completing our geographical knowledge of the northern parts of this extensive and important colony, besides promoting the settlement of the country. The object of the promoters of these surveys is the eventual connexion of the 9000 miles of the Australian telegraph system with lines from Europe *via* India and the Dutch settlements in the Malay Archipelago. It is satisfactory to note that even in Queensland the telegraphs pay already about 2 per cent. on the capital expended. The following is an extract, bearing upon the subject, from the Report of Mr. W. J. Cracknell, the Superintendent of Electric Telegraphs in Queensland, dated May 1, 1867:—

"I cannot refrain from pressing on your consideration the desirability of commencing, at the earliest possible moment, the proposed extension of the northern lines from Bowen, Port Denison, to the Gulf waters. On the 19th of March, last year, the late Mr. Frederick Walker was despatched from Rockhampton, with a well-equipped party, to explore the country between the east coast and the Gulf of Carpentaria, for the purpose of discovering the most eligible route for the proposed extension to Burketown. Taking a final departure from Townsville, Cleveland Bay, he so far effected the object of his mission by a cursory survey from that point to the Gulf settlement; but, unhappily, to the loss of the public service, whilst with like purpose returning thence by a different route to Cardwell, Rockingham Bay, he died in camp at Floraville, Leichhardt River, on 19th November, 1866. In consequence of Mr. Walker's illness and death, his journal and papers are incomplete, and, in

order to have a full record of the proceedings of the party, I requested Mr. H. E. Young, second in command, who has successfully carried out the purpose of the expedition, to furnish me with a complete journal. The 670 miles of country traversed on the outward journey is for the most part badly timbered; a plentiful supply of good quality being only obtainable for a distance of 154 miles; indifferent timber for 131 miles, and the remaining 385 miles is entirely devoid of any description of timber that could possibly be made use of for telegraphic purposes. It will be observed, on referring to the explorer's journal, that the distance travelled by this route is slightly in excess of that *viâ* Cardwell, added to which the scarcity of timber would render the construction of a line through the country in question by far too expensive. From information now available, I am led to believe the most eligible route for the Gulf extension will be to continue the line from Bowen *viâ* Townsville and the eastern side of the coast range to Cardwell; thence by the new gap in Seaview Range (about 25 miles north-west from Cardwell), *viâ* Mount Surprise, gap in Gilbert Range, Gilbert River, to Smith's Station; thence by the return route of exploring party to Burketown,—a total distance of 662½ miles. From Bowen, by this route, to within 107 miles of Burketown, the country is, on the whole, well timbered and well watered; there is, therefore, no impediment, either from lack of material or otherwise, to the tolerably easy and economical construction of a line of a similar character to the Rockhampton-Bowen section, say 20 posts to the mile. To obviate the scarcity of suitable timber on the 107 miles from Burketown referred to, I would propose to use iron poles, to be conveyed by sea to convenient points on the coast, and as they will then only require to be carted a very short distance over level open country peculiarly easy of travel, the expense of land carriage will in such case be trivial; indeed, the cost of this portion will, I apprehend, be much less than if wooden poles were to be carted from a distance, and not much in excess of what it would be if suitable timber were available nearer at hand.

“Recent advices plainly indicate that the successful establishment of telegraphic communication between the United Kingdom and America has stimulated the previously existing keen demand for the extension of telegraphic communication throughout the world. It is not, therefore, surprising to find public attention actively directed to the expediency of improving and extending the Indian lines, nor yet to find proposals afloat, the which, when carried into execution, will draw the telegraphic systems of India, Europe, and America, considerably nearer the Australian continent.

“I learn from the report of the General Superintendent of Electric Telegraphs, Victoria, for 1866, that this Company is still negotiating with the Imperial Government, and that, at a meeting in London of gentlemen interested in this matter, certain resolutions were drawn up and presented to the Right Hon. the Earl of Carnarvon, Secretary of State for the Colonies, which had been agreed to and signed by the promoters of the meeting.

“Happily, a considerable section of the intermediate distance between India and Java is in course of construction by the Netherlands India Government, namely, from Batavia through Sumatra to Singapore; and the Eastern Asia Telegraph Company propose to carry their line by land from Moulmein, or some other point in the Tenasserim provinces where the British Indian line terminates, passing down the Malay Peninsula, *viâ* Penang and Malacca to Singapore, on the completion of which Banjoewangi (East Java) will be in direct telegraphic communication with India, Europe, and America. If any serious obstacle to laying a cable thence to the north coast exists, it will be found in the coral bottom of the intervening sea; but it remains for a more minute survey than has hitherto been made to discover whether a safe bed cannot be obtained. In the mean time, provision of fleet steamers to ply

between the termini has been suggested. It is, however, hardly necessary upon the present occasion for me to discuss the feasibility of this or other proposed expedients to the same end; but, in view of the circumstances and exigencies of the times, both without and within the Australian colonies, in reference to the necessity for means of more prompt communication between Australia and the United Kingdom, it can but be universally admitted that the Gulf extension should be carried out with the least possible delay."

2. Exploration of the Mouths of the Flinders River, Gulf of Carpentaria.
 Extracts from a Report of Mr. W. LANDBOROUGH to the Governor
 of Queensland.

(Communicated by the COLONIAL OFFICE.)

Burketown, Gulf of Carpentaria, 9th February, 1867.

For some time past the settlers on the Flinders River have been most anxious to have the inlets examined to the eastward of the Albert River, in the hope of finding a more conveniently-situated place for the shipment of their produce than Cleveland Bay and this port, to which places they have to send it at present. Last month an opportunity occurred of examining Morning Inlet, through the kindness of Captain Ellis, master of the schooner *Lily*. With Captain Stokes' admirable work in a person's hands, and the chart of the coast, it is a very easy matter to find any of the inlets by coasting in a small boat along the shores of the Gulf; but with a vessel of considerable draught it is not so easy, as the shallowness of the water all along the coast renders it necessary to keep so far off the land that it is difficult to distinguish the openings. Captain Ellis, however, skilfully succeeded in finding, by moonlight, Morning Inlet, on the 23rd of January.

Leaving the *Lily*, Mr. Phillips and myself went to the inlet in the pilot-boat, and, after examining it we felt doubtful that this was the inlet we were in quest of, as we could not discover any promontory corresponding with Middle Point of Captain Stokes, so we returned to the *Lily*. Afterwards, we got Captain Ellis to coast to the eastward sufficiently far to decide that if the inlet we had been at was not Morning Inlet, that Morning Inlet must be to the westward, so we then got him to put the ship about, and sail in that direction. It now became my intention to take to the small boat, with the object of more particularly examining the coast; and having arranged with Captain Ellis to meet him, after the survey, either off Gore Point or the Albert, we started. Coasting near the land from Gore Point eastward, we were quite satisfied, on our arrival, in the afternoon, at the inlet we had been at previously, notwithstanding the discrepancy I have mentioned respecting Middle Point, that it was Morning Inlet. Middle Point is very low, with mangroves, and it is not improbable that the missing part may have been washed away since it was surveyed by Captain Stokes. We got into Morning Inlet about 4.45 P.M. Our progress was so rapid, owing to the tide being in our favour and the straightness of the various reaches of the river, that before midnight we reached latitude 18°, a point further south than any boat had previously reached in any other river of Carpentaria. The place we reached is midway between the Leichhardt and Flinders rivers, and about 70 miles east of the Albert Settlement. The river is narrow, but were it required as an outlet it would be adapted for vessels of a small draught of water not exceeding 6 feet, and could be navigated within 10 miles of the point we reached with the pilot-boat. Like all the rivers of Carpentaria, its banks are low, where the difficulties of navigation are few; but as you approach higher up, where good situations for townships present themselves, the river becomes more impeded by shoals and other

obstacles. Some settlers whom we met agreed that the Norman River, which they said was situated 15 miles to the eastward of the Flinders, was apparently superior to Morning Inlet.

Late in the afternoon we left Morning Inlet in search of the *Lily*, and anchored near Gore Point. Next morning we pulled to the *Lily*, which was about 10 miles to the westward, and informed Captain Ellis of the arrangements we had made. Captain Ellis, after giving us what provisions he could spare, sailed to Sweer's Island, and we left to go in an almost opposite direction to Bynoe Inlet. In the evening, as the weather was squally, we were exceedingly glad to get safely into an inlet named Ell Creek by the settlers. Ell Creek is the first of any consequence to the west of the Flinders, in the direction of Morning Inlet, that is easily distinguishable from the offing to the westward of the Flinders. We were detained there in consequence of squally weather until late in the afternoon of the following day, and during our stay went, in search of water, inland to the westward. The country consists of fine grassy plains, intersected with mud flats, and is as fine pastoral country as any that I have ever seen in Queensland so near the seaboard. After leaving Ell Creek we sailed to the Flinders, and took shelter for the night. The entrance to the Flinders merits the favourable description given of it by Captain Stokes, and is easily distinguishable from the sandy beach on the east side of the river, mangroves being generally the prevailing feature elsewhere.

Proceeding to the Bynoe, which we then supposed was the Norman of the settlers, situated 10 miles eastward from the Flinders' entrance, we were much pleased to find the soundings most satisfactory, and coinciding with the description of Captain Stokes, its discoverer, who found the depth of water at the entrance to be as great as that of any other river of Carpentaria, but time did not admit of his surveying it above a few miles. Further up the river, for a long distance beyond where it was previously surveyed, we found no rocky bars, and a depth of from 2 to 6 fathoms; but in consequence of having no water we were obliged to push up the river at night, and could only take soundings. The survey of the river Mr. Phillips left for the passage down, and the second evening we were nearly as far up as the boat could go, and the water drinkable. A walk on the following day, of nearly 2 miles, along the bank of the river, brought us to where the land party had crossed, and in the evening we shifted the boat to the crossing-place, where we remained two days, in the expectation of the land party finding us. At the expiration of that time Mr. Phillips and myself resolved to go in search of Messrs. Smith and Company's station for a supply of rations, of which we had run short. I had been led to suppose that Smith's station was 6 miles up the Flinders from where it was navigable, and I supposed that I could make the station in about 15 miles. When we had reached 2 miles we came upon a large salt-water river, and when we had traced it some distance to the northward we concluded it was the Flinders. Next day we went up the river without finding any recent traces of stock, which gave us but little prospect of finding Smith's station. The following day, having given up the idea of finding Smith's, we followed the river up, intending to make Mr. Halloran's station, and came to a single dray-track which led us to it early on the morning of the third day. The country we traversed was excellent, and the sheep at Mr. Halloran's, by their fine condition, testified to its being well adapted for pastoral purposes. From Mr. Halloran we learned that Mr. Smith's station was situated on Armstrong Creek, a western tributary of the Flinders.

The Bynoe we found was the main branch of the Flinders, and discovered that these rivers separated from the one channel, at a point about 5 miles above where we reached with the boat. The settlers had mistaken the Bynoe for the Flinders in consequence of its being the main branch. The country is excellent for pastoral purposes, and has fine, dry, hard ridges, presenting good

sites for building. At 2 miles below the boat these fine ridges lie close to the river, and about 2 miles below the lagoons there is a range at least 200 feet high, which, from the information I gathered from the settlers, extends to the Norman, about 15 miles.

I cannot conclude without again expressing my firm belief—strengthened by the experience I have lately gained—that Carpentaria country must become a territory of the greatest importance, owing to the vast extent of fine available country which has proved itself singularly well adapted for sheep and cattle.

3. *Great Volcanic Eruption in Iceland, in August, 1867.* Extract of a Letter from Dr. HJALTELM to J. W. EVANS, Esq.

(Communicated by Sir R. I. MURCHISON, Bart., President.)

At the end of August a most remarkable volcanic eruption took place in our island. Its story runs shortly thus:—

On the 29th of August, by somewhat misty weather, but tolerably hot, the temperature being about 13° of Celsius (55° 40' Fahr.), a tremendous sulphureous odour was found all over our little town. The barometer was about 29·4, and very little wind blew from the s.e. I immediately supposed that an eruption might be going on in the east volcanoes; and the next day showed that my prediction was quite right. In the evening heavy shots were heard beneath the mountain Esja, and a rolling, like thunder, was heard underground. On the 30th August, by clear weather, and a small breeze from the s.e., the same odour was felt all over the southern part of our country, and in the evening, at about 7 o'clock, a heavy fire was seen in s.e. to e. direction from hence. It was a white blue flame, like burning sulphur, and this lasted all night, and could be seen more than 100 miles out at sea. Lightning and rolling thunder were also heard in all our mountainous regions, but no earthquake was felt, neither here in Reykjarvik nor in the mountainous regions, so far as we know. At the same time as the eruption, with its tremendous flame, was seen here in our town, it was also seen in the northern part of our island; and seen from Myvatn it was directly in a south direction. A merchant vessel sailing at that time south of Portland saw the eruption in a north direction; and in the South Skaptafells Sysla grey white ashes fell on the grass. This remarkable eruption lasted only for three days, viz., the 29th, 30th, and 31st of August, but after that time only a whitish-grey cloud was seen in the same direction.

In the beginning we were here at a loss to find out the exact place of this tremendous but very curious eruption. Seen from hence it might be very near Stekla or Kandakampa, an old volcano which in former days, in 1449, poured out a very destructive lava-field; but it was by travellers soon found out that it could be in neither of those places. Now all people from the east part of this country agree in the opinion that this eruption must have been on the north side of Skaptár Jökull, and the same opinion is held by people coming from the north.

To tell the truth, this volcanic eruption was one of the most curious ones we have heard of. Its sudden appearance, without any earthquake, its enormous flames, which overlooked all the high mountains, its accompanying strong sulphureous odour, which was perceived, as far as we know, all over the island, make it one of the most extraordinary volcanic phenomena I have heard of. I was only able to collect some few grains of the small quantity of ashes which fell on the ground, and found it consisting of a little pumice-dust

and pure sulphur. Go and tell the excellent Sir Roderick Murchison about it, and I will, with great pleasure, give him the best description I can.

I must tell you another remarkable circumstance which I have observed this year; it is a considerable elevation in the temperature of the sea, and a great force in the Gulf Stream. The captain of the yacht *Marquis of Bute* told me that the Gulf current was running with unusual speed, and the same has been observed by our fishermen. The waters have, on account of this, during the spring tide, been extraordinarily high. It is most likely also due to this that we have this autumn enjoyed a very high temperature, for the most part between 8° (46° $4'$ Fahr.) and 12° (53° $6'$ Fahr.) of Celsius, and have as yet very little or no snow at the tops of our southern mountains.

PROCEEDINGS

OF

THE ROYAL GEOGRAPHICAL SOCIETY.

[ISSUED MAY 7TH, 1868.]

SESSION 1867-8.

Fourth Meeting, January 13, 1868.

SIR RODERICK I. MURCHISON, BART., K.C.B., PRESIDENT, in
the Chair.

PRESENTATION.—*A. M. Bethune, Esq.*

ELECTIONS.—*A. L. Elder, Esq.*; *J. A. B. Horton, Esq.*, M.D., &c.; *Robert Jardine, Esq.*, B.A.; *Eugene Morris, Esq.*; *M. C. Morrison, Esq.*; *Augustus H. Mounsey, Esq.* (H.M. Legation, Teheran); *George Macnair, Esq.*; *John F. Pownall, Esq.* (Magistrate for County of Middlesex); *John Pender, Esq.*; *J. B. Redman, Esq.*, C.E.; *H. P. Stephenson, Esq.*, M.I.C.E.; *Dr. Thomas Staley* (Bishop of Honolulu); *Thomas Osborne Stock, Esq.*, M.P.; *Henry A. Tilley, Esq.*; *Major George H. Waller*; *Robert Watson, Esq.*; *Edward B. Webb, Esq.*, C.E., &c.

ACCESSIONS TO THE LIBRARY from DECEMBER 5TH, 1867, to JANUARY 13TH, 1868.—‘The Middle Kingdom: a Survey of Geography, Government, &c., of the Chinese Empire,’ 2 vols., by J. Wells Williams. Presented by Dr. Lockhart. ‘Climate and Meteorology of the West Coast of Africa,’ by J. A. B. Horton, M.D. Presented by the Author. ‘Coal Deposits, New Zealand,’ by James Hector. Presented by the Author. ‘Aus dem Orient—Nil, Sinai-Halbinsel und in Syrien,’ by Dr. Oscar Fraas. Presented by the Author. ‘The Sailor’s Word-Book, a Digest of Nautical Terms,’ by Admiral Sir E. Belcher, K.C.B. Purchased. ‘South Australia: North Territory Exploration.’ Presented by F. T. Dutton, Esq. ‘Voyage aux Provinces Brésiliennes de l’Amazonie en 1860-61.’ Presented by Sir Woodbine Parish. ‘Asowschen Meeres,’ von G. V. Helmersen. ‘New Zealand; its Physical Geography, &c.,’ by Dr. F. Hochstetter. Stuttgart, 1867. Presented by the Author. ‘Jamaica in

1866; a Narrative of a Tour through the Island,' by T. Harvey and W. Brewin. Presented by the Authors. 'The Adventures of my Grandfather,' by J. L. Peyton, Esq., 1867. Presented by Colonel Peyton. 'Etudes sur les Affinités Chimiques,' par C. M. Guldberg et P. Waage. Presented by the Christiania University. 'Bulletin de l'Académie d'Hippone, Soc. de Recherches Scientifiques et d'Acclimatation,' Bone, 1866. 'International Company of the Columbian Canal.' Presented. Dr. L. G. Blanc's 'Handbuch, Geschichte der Erde und ihrer Bewohner,' Auflage von Dr. H. Lange. 4 parts. Presented by Dr. Lange. 'On the Nature and Discoloration of the Arctic Seas,' by R. Brown, Esq. Presented by the Author. 'School Geography,' by James Clyde, 10th edition, 1866. Purchased. 'Le Pilote du Golfe Persique.' 'Pilote du Golfe d'Aden.' 'Annales Hydrographiques,' to date. 'Catalogue des Cartes.' 'Routier de l'Australie, Côtes N., N.O., et Ouest,' par Charles Yule, R.N., traduit par Besson. 'Renseignements Nautiques sur quelques Ports de l'Océanie, de la Nouvelle Hollande et de la Mer Rouge,' par R. Foy, 1866. 'Routier du Golfe du Mexique en France,' par M. B. F. Gasset. 'Routier des Côtes sud d'Afrique, du Cap de Bonne-espérance, au Cap Gardafui,' par A. F. B. de Horsey, M.R.A. 'Routier de l'Île Jersey par J. Richards, R.N.,' par Jules Vavin, 1866. 'Considérations général sur la Mer Méditerranée; Résumé des Vents, Courants et Routes de cette Mer,' par A. Le Gras, 1866. 'Mer de Chine,' par M. A. Le Gras. 'La Nouvelle Calédonie.' 'Le Côté Ouest de la Corée.' All presented by the Minister of the French Marine. 'Euphrates Railway, Papers relating to.' Presented by Mr. Andrews. 'Meteorological Observations, Sydney,' by G. R. Smalley, Esq. Presented by the Sydney Observatory.

ACCESSIONS TO THE MAP-ROOM SINCE THE LAST MEETING OF DECEMBER 9TH, 1867.—Ethnological Map of Russia in Europe, on 2 sheets. Presented by Sir R. I. Murchison. Three small Maps of Australia, showing the routes of Warburton, Walker, and McIntyre, by Dr. A. Petermann. Five Maps of Abyssinia, by Antoine d'Abbadie. Presented by W. D. Cooley, Esq. Four Maps of Queensland, showing the proposed routes of the Electric Telegraph, by Messrs. Walker and Young. Two sheets of the Topographical Map of Sweden. Presented by Major-General J. A. Hazeliuss, Chief of the Topographical Corps of Sweden. Map of North-Western America, showing the territory ceded by Russia to the United States, by B. Peirce. Presented by the United States' Naval Department. Atlas to Fay's Great Outline of Geography. Karte von Ost-Sudan, showing the route of Carl Graf Krockow von Wickerode.

Map of the German Colony in the Brazilian Province of Rio Grande do Sul. Presented by Bruno Hassenstein, Esq.

The PRESIDENT stated that before proceeding with the business of the evening he had to announce that he had that morning received a letter from Dr. Kirk, respecting Dr. Livingstone, which he would read :—

“DEAR SIR RODERICK,

“Zanzibar, 29th October, 1867.

“I write now only to assure you that nothing further has reached us regarding the traveller in the Lake Regions, who must without doubt be Livingstone, since we have news of him from Quiloa as having been seen west of Nyassa, where gold is found.

“Bunduki, the native to whom the letters were given, has not yet reached the coast, being delayed, as we hear, by carrying ivory in double journeys from village to village; and he is still too far off to make it of any use sending men to receive the letters which he has in his possession. We must bear patiently these African delays, and live on the hope which these rumours encourage.

“It will be some time before we can write to Johanna; but I hope that Moosa and his companions may be well watched, and, when the time comes, severely punished for the misery they have caused. They, however, press their claims for salary, and have even sent men here in the hope of getting their wages paid.

“Mr. Brenner goes in the same vessel with me to Lamoo. I go on a short leave, the first I have had since I came out. He goes to explore the Dana River, which opens into Formosa Bay. My next letter, I hope, may be accompanied by those of Dr. Livingstone.

“JOHN KIRK.”

The following papers were read :—

1.—*Explorations in the Isthmus of Darien.* By M. LUCIEN DE PUYDT.

IN this Memoir M. de Puydt communicated the scientific results of two explorations which he made of the Isthmus of Darien in the years 1861 and 1865, having for object the discovery of a practicable line for a ship-canal to connect the two oceans. His researches in the first expedition were directed towards the line proposed some seventeen years ago by Dr. Cullen between the Gulf of St. Miguel and Caledonia Bay, which had been insufficiently explored by the international expedition sent out about that time. The result of this first journey was to confirm the conclusion arrived at by Mr. Gisborne, namely, that no practicable line exists for an inter-oceanic canal in this direction. A journey was afterwards undertaken up the River Tuyra, as far as Paya. M. de Puydt thereupon returned to France, and in 1864 he was charged by the French Government to organise another party for the purpose of examining thoroughly the low range of the Andes about 60 miles to the south of the line above mentioned, where the River Tanela discharges itself into the Atlantic, near the northern arms of the River Atrato. The expedition was formed in New Granada, and, after a toilsome

exploration of several months, succeeded in discovering a break in the Andes, at the upper course of the River Tanela, which renders possible the formation of the long desired object of a ship-canal between the two oceans. The narrative of M. de Puydt in a condensed form is to the following effect:—

I left France in December, 1864, and proceeded to Carthagena in New Granada, where I organised my expedition, composed of fourteen men. Three of these merit especial mention in consideration of the devotion with which they assisted their leader in carrying out the objects of the expedition: these were M. Ferdinand Mougel, jun., Engineer, and Messrs. Truchon and Decurey, residents of Carthagena, and who, excited by the grandeur of the project, had resolved to share the dangers of the journey.

Before finally leaving for the Isthmus I made a journey to Bogotá, for the purpose of examining all maps and documents existing in the capital that might throw light on the geography of the Isthmus. It was not till the 28th of June, 1865, that we left Carthagena, in an old coasting-vessel of thirty tons' burthen, named the *Esperanza*.

We were obliged to keep close to the shore, and to navigate only during the day, in consequence of the rotten state of the vessel, and the frequent squalls which blew from the south almost every night. In doubling the Point of Caribana, to enter the Gulf of Uraba, we nearly suffered shipwreck on a reef called Lavadera.

On the 7th July we arrived at Pisisi, a little village near the mouth of the Turbo, on the eastern coast of the gulf. Being so near the site of our intended operations, I hoped to be able here to obtain some information about the country which might be useful to us; but it was impossible to learn anything. The inhabitants said the district was inhabited by wild Indians, commanded by a Cacique of savage temper, and hostile to all strangers. They said that none but Indians of the same tribe could enter their rivers or villages without running imminent danger of life. A more important piece of information was that the River Tanela, which I was in search of, had no existence, the name being simply that applied to one of the thirteen mouths of the Atrato. I was, however, so convinced my informants were wrong—having ascertained by old maps that this river existed as an independent stream—that I gave no heed to their warnings. I ordered the pilot of our vessel to obey my orders without a word of opposition, and to follow the route I should point out.

We left Pisisi on the 10th July, crossing over with a good breeze to the mouths of the Atrato, two of which (Boca Grande and Boca Tarena) we passed, and found them so silted up that there was no

longer sufficient depth of water to enable the canoes of the Indians to enter them. In the afternoon we cast anchor off the mouth of the Tanela, and, at a distance of two miles from the shore, seen through a glass, the coast appeared like a long hedge of mangroves, sheltered behind a bar of sand, on which the sea broke with great force. To the west rose a chain of hills, terminated on the south by the Peak Tarena, and on the north by the Peak Gandi. A group of islands bounded the view off the coast towards the north.

We proceeded now to disembark to make a preliminary examination of the river, I, M. Mougél, M. Truchon, and four good paddlers in our small boat, all well armed. We passed the bar, happily in safety, and at the bottom of a calm and beautiful little harbour found the mouth of the river, about 22 yards wide, and not visible from seaward. Paddling up the stream we found it near the mouth three fathoms deep, and, six miles upwards, one and a half fathom; but the water was below its mean height. Its direction is generally w.s.w. to a point where there is a confluence of two streams, the more northerly of which descends from the Sierra de Estola, and the more southerly has its source between the buttresses of the Sierra de Mali.

Existing maps erroneously represent the Tanela as having two mouths. It has but one, but the nature of the ground shows that it may have formerly had two or more mouths. The immense sedimentary deposits of the Atrato have gradually filled the whole of the bottom of the Gulf of Uraba, forming level sand-banks, supporting a growth of mangroves, and traversed by numerous channels more or less navigable.

Before penetrating further into the country towards the Cordillera it was necessary to make an extended survey of the river, and especially to ascertain the disposition of the Indians of the village of Tanela, who were reputed hostile to all strangers. The position of the village had also to be ascertained, as it was unknown.

On the 11th July I re-entered the river with a strong party. Beyond the point reached the day before it becomes broader in places, and its bed is encumbered with *débris* of rocks. A deserted *rancho* or hut was met with, under which were two small boats, and a short distance beyond there was another hut, surrounded with banana-trees, and also deserted.

On the following day, towards evening, we reached the confluence of the two streams before mentioned. From the sea to this point there are no less than seventeen obstructions in the shape of rapids or falls; but all of slight inclination and easy to surmount, either by towing or poling. At the confluence there is a rapid with an

inclination of nearly 5 feet, which is a much greater obstacle. In the season of rains these rapids and falls would all disappear with the elevation of the water a few inches above its present level.

Leaving the smaller of the two branches to the left, we ascended the northern stream in search of the Indian village. The Indians of the Tanela are expert navigators, and their canoes, constructed of single trunks of trees, are remarkably well made. Their huts are formed entirely of bamboo and are extremely neat, the roof being covered with palm-leaves artistically woven together. We slept in a hut of this kind on the night of the 12th.

On the evening of the following day we arrived at the village. The inhabitants were all out on the bank of the stream, and as soon as we came in sight a canoe manned by three Indians put off and advanced towards us. One of the men was Nusalileli, Cacique of Tanela; he gave us a most friendly reception, and invited us to rest for the night in his village. We received there the frankest hospitality, but it was impossible to obtain from the Indians the least information about the interior of the country, the paths, or the situation of certain points we wished to know.

We left Tanela on the 14th, the Indians refusing to accept any recompense for the hospitality they had given us. Although we had not succeeded in overcoming their distrust with regard to the objects of our journey, I was convinced that we had nothing to fear on the score of opposition by force to our movements.

My plans were now finally arranged. I resolved to disembark from our large vessel all the *matériel* and provisions, ascend the Tanela as far as the confluence, construct a hut at that point to serve as basis of operations, and commence from there to open a path through the virgin forest, guided by the compass, and pursuing the direction of the southern branch, which would probably lead towards the Pacific slopes by some one or other of the depressions or transverse valleys of the Cordillera.

The execution of this plan was commenced without delay. Unfortunately an accident occurred to delay its progress. One of our canoes, carrying M. Truchon and six men, was capsized in passing the bar, at the moment when a sudden squall compelled me to weigh anchor and remove the larger vessel. Happily no life was lost; but our party became divided for many days. It was not till the 24th that we were enabled to commence operations in the forest of the Tanela. The whole of the expedition, with provisions and tools, were then ashore. I now put in execution a plan I had conceived to prevent the desertion of our ten labourers, who were chiefly half-breeds, having great dread of the Indians, and likely to abandon us

on the first sight of a conflict with them. I made a signal to the pilot of our vessel to hoist sail and leave us for Pisisi, to return for us in September. Our men were stupified at the spectacle of the departure of the vessel, but they now knew that they had no help for it but to march onward and perform their duties.

The Indians aided us to construct our huts; our relations with them, in fact, were most peaceful. In order to avoid repetition, I may say that this state of things continued up to the end of my exploration.

Five days afterwards we commenced clearing our path. We had scarcely begun when a body of 19 Indians, tattooed and armed, from two other villages, came to visit us, and tried, by all sorts of lying stories, to dissuade us from our enterprise; but finding all their efforts vain to shake my resolution, they left us. A second body of Indians still larger, and headed by their Cacique, came on the 10th, and we could not get rid of them until after a debate which lasted three hours, when they found that all their descriptions of the obstacles that lay in our way were powerless to prevent us going on with our project. During these disputes the work of exploration was not interrupted, except by attacks of fever from which some of us suffered. After eighteen days had thus passed, I made a short excursion out of the path our men had laid open, with a view to ascertain the nature of the upper course of the northern branch of the Tanela. The stream, which I found without much difficulty, was running in a rocky bed and interrupted by falls of three or four feet in height. A storm which swelled its volume so considerably that I was obliged with my two men to spend the night on its banks, convinced me that the river receives the waters of the rains which fall on the broad plateaux of the salient ridges of the Sierra de Estola, where it takes its rise. The southern branch does not rise in the mountains, as is proved by the fact that a heavy rain of fourteen hours' continuance did not perceptibly affect its volume.

During the two following days I tracked the course of the southern branch as far as the foot of the slopes of the Mali Mountain. I was able myself to see, on mounting an elevation, through the opening in the forest caused by the river, the two summits of Mali and Estola sloping abruptly and leaving between them a breach in the form of a V, beyond which nothing was visible to the western horizon. During many days' wading through water and swamps I succeeded in examining all the undulations of the district, and I was convinced that the object so long desired—the discovery of a break in the Cordillera of the Isthmus—was within my reach.

After observing with accuracy the bearings of the path we had opened through the forest, I departed on 25th August with M. Decurey and five of our best men, loaded with our hammocks and provisions for five days. M. Truchon remained in command of the party, with the instructions that if I did not return by the end of the month he was to proceed without me to the sea-coast.

We on our parts committed ourselves to the task of penetrating the forest towards the west, perhaps to perish, perhaps to discover a path to the shores of the Pacific.

We pursued our course towards the ridge of Mali. On the night of the 26th we slept at the foot of the range, and on the morning of the 27th ascended the mountain at an altitude of about 1300 feet above the plain. On the side of the Pacific the slope was almost perpendicular, and a splendid view was obtained of the limitless wooded plain, through which flows the Tuyra and its affluents. From this sea of verdure emerge the peaks of the chain which limits the course of the Chucunaque, and which extends towards the N.N.W., fading away in the blue distance.

It was clear that we had here attained the most westerly limit, in this district, of the chain of mountains which separates the Atlantic from the Pacific slope. It remained now to ascertain whether, at the foot of this same Peak of Mali, the waters of the Tanala were still to be found with the same slope and current.

By the help of our hands, or gliding down on all fours, we made rapid way through the dense masses of ferns and underwood in our perilous descent to the foot of the Peak. I here found, as I had expected, the river, much diminished in volume, and running in a zigzag course between the slopes of the two mountains. It ran alternately west and south, thus giving a general direction to the passage through the Cordillera of s.w. I continued walking in this latter direction with M. Decurey, sometimes wading through the water, at others climbing along the face of the slope, until at length we arrived at the end, where the same spectacle opened to our view as that which we had beheld from the summit of Mali. The prospect towards the west was boundless; the great plains of Darien stretched away to the horizon without any obstacle intervening to intercept the view. The Tanala had become a mere rivulet, fed by threads of water which descended the slopes on both sides, and hidden with shrubs and fragments of rocks.

It was clear we were here on the culminating point—the watershed of the Atlantic and Pacific, where the Nique chain of mountains was depressed to its lowest elevation.

In returning to our encampment I traced downward the course

of the Tanela in order to make doubly sure that we had not wandered away from the desired line by the *détours* made in climbing the Mali. In the evening of the 28th of August we rejoined our friends, and celebrated the successful result of our difficult enterprise and the discovery of what had been deemed impossible by so many even among those who were most competent to judge. On the 3rd of September we made sail for Carthagena.

It is necessary here to state that, in descending the Tanela, I made a series of observations on the rapidity of the current of the stream, at all the points of its course. These observations, which I am aware do not lead to a positive result regarding the facility of making a ship-canal across the Isthmus, and which can only be accepted as a temporary substitute for a proper series of levelings, have been submitted to an engineer for calculation. The height of the watershed between the two oceans, resulting from the slope of the Tanela as shown by its current, was found to be little more than 100 English feet (30·79 mètres), and the length of the line having this altitude is only 5 miles. Allowing for deficiencies in the data furnished, we may calculate the maximum altitude of this lowest depression in the Cordillera at about 140 feet. As to the employment of a barometer for measuring low elevations in tropical countries, it is well known to be of very little use, and more accurate results than those here given cannot be expected, unless a set of levels by competent engineers be undertaken. The humidity of the climate, the strong electric tension, the abrupt variations of atmospheric pressure, and the want of tables for correction of error special to these regions, would have rendered the results of barometrical observations very doubtful.

Having concluded his narrative, M. de Puydt enters into various details concerning the geography, climate, ethnology, and natural productions of the Isthmus of Darien. He remarks that the best maps are very incomplete as regards the number, position, and course of the numerous rivers, and he enumerates the affluents of the Tuyra, the great stream which discharges itself into the Gulf of St. Miguel on the Pacific side, and which will form portion of the ship-canal which he advocates along the line he has explored.

The Cordillera of the Andes along the Isthmus, he says, is quite erroneously represented on all maps. The mountains, according to his observations, form three parallel chains; of these the most westerly and highest is the Sierra de Estola, which forms a continuous ridge, except at the source of the Tanela, where it is abruptly depressed as he had described. To the south of the gap

it takes the name of Sierra de Mali. The second chain, commencing at Cape Tiburon, follows the sea-coast, forming in some places precipices facing the sea. It is traversed by numerous narrow valleys, through which streams flow, and terminates abruptly at Peak Tarena at the mouth of the Tanela. The third chain, south of Cape Tiburon, forms a line of precipitous islands parallel to the coast.

The Gulf of Uraba into which the eastern or Atlantic end of the future ship-canal will open, has, throughout, to within two miles of the eastern side, a minimum depth of 10 fathoms. The climate of the Isthmus is generally healthy; the depressions in the Cordillera and the numerous streams of water producing a free circulation of aerial currents between the two oceans and dissipating miasma. The seasons of the two coasts, however, do not exactly coincide, and M. de Puydt gives further details on this portion of his subject. The low lands near the coast, and particularly those formed by muddy deposits, are the only unhealthy places, and the vast multitudes of mosquitos render them almost uninhabitable.

The paper will be published, with the author's map, in the 'Journal,' vol. xxxviii.

The PRESIDENT said M. de Puydt had given them a very well-written and attractive description of a country which was very little known to geographers. This gentleman was not known to him personally; but the merits of his work had been brought before him by Mr. Archibald Peel. A map of the exploration had been given by the author, and he (the President) had felt it his duty to call the attention of geographers to several features in it which were new. When M. de Puydt ascended the Tuyra from the Pacific, he ascertained the whole character of the flat and undulating region which lay to the west of the great Estola chain of the Andes, and was convinced there was to be found in that direction a depression in the range. Fitting out a small vessel at Carthagena, in his subsequent expedition, he determined, in the first place, that the little River Tanela was not, as the natives told him, one of the mouths of the Atrato River, but was an entirely independent stream, having its source to the west in the chain of mountains which he had previously described. After having ascended two branches of the river, and found that the southern branch was the one which led most distinctly from the mountains, he discovered that it flowed through a pass, or gap in the range, and by calculating the velocity of the current and rapids, he had determined that this gap between the mountains of Estola and Mali was not more than from 117 feet to 132 feet above the level of the sea. If this calculation had been verified by a series of correct observations, it would be a most important discovery with respect to the chain of the Andes. He told us that the hills near the depression were 400 mètres and 500 mètres in elevation; but he did not tell us that he himself ascertained the altitude of the mountains, or that the altitude was fixed by any accurate observations. At the same time, if these were approximations to the truth, the gallant manner in which M. de Puydt had carried out his expedition, under great difficulties and with very small resources, was certainly deserving the approbation of all geographers. It was not to be imagined, if any canal was

to be established between the Atlantic and the Pacific, that the port upon the eastern side would be at the mouth of the little River Tanela: this would be impracticable, on account of the bar; therefore it was probable that the port of Escondido, a little to the north, would be the port from which the canal would have to be made. The question of crossing the Isthmus had been discussed by the Society on former occasions, and had excited the attention of geographers, civil engineers, and the world at large. But this was an account of an entirely new exploration which had been brought before them, and he begged to return the thanks of the Society to M. de Puydt for his communication.

Mr. G. W. HEMANS, C.E., said, as a civil engineer, he had listened with great interest to the paper which communicated the supposed discovery of what had been sought after for many years, more particularly by the expedition conducted by the late Mr. Lionel Gisborne—a great depression in the Andes of the Darien Isthmus; the data, however, which had been obtained by that exploration were, in his opinion, hardly commensurate with the expenses of such an expedition. He could not agree with the author of this paper in his idea that any measurement of heights could be determined by the velocity of water flowing from them; he did not believe that the most careful observations on the velocity of seventeen rapids could enable him to arrive at anything like a true measurement of the height of the pass. Considering the position of that range of mountains, and its elevated appearance so near to the Isthmus of Darien, it appeared to him unlikely that any depression would be found so low as 30 or 40 mètres. It was to be regretted that an explorer of so much activity and energy should not have taken the trouble of carrying with him even a pocket aneroid, which, without the trouble of barometers, would have given something like a scientific approximation to the real height of the pass.

Captain BEDFORD PIM quite agreed with what had fallen from Mr. Hemans with reference to the mode in which the height of the pass had been obtained by the explorer. It was not his intention to enter into any criticism upon the exploration, because there was a practical difficulty in carrying out the canal scheme across that part of the Isthmus of Darien, which he thought was insurmountable. By the Panama Railway concession, which had just been passed, dated the 16th of August, 1867, reforming the contract of April 15th, 1850, the Government of New Granada had bound itself not to construct, or to concede to any person or company the right to construct, a railway or an oceanic canal in the territory to the westward of a line drawn from Point Escoces on the Atlantic to Point Garachine on the Pacific, which would include the Pacific terminus of M. de Puydt. So that, without the permission of the Panama Railway Company, it was impossible for any one to make a canal, even supposing it was a dead level from one ocean to the other. He understood from the paper that a company had been formed in Paris to make this canal. It seemed to him most important, and it was a duty, on his part, to point out this difficulty. Then, again, there were difficulties in respect to the "physical geography of the sea" on the Pacific side, which had more than once been pointed out by Captain Maury himself, and which seemed to be too little considered in all transit schemes. To revert to M. de Puydt's loose way of ascertaining the height of the country by the velocity of the rapids, he could give an example in his own experience of exploration in Nicaragua to show its fallacy. At San Carlos, the point where the Lake of Nicaragua flows into the River San Juan, and which is 130 feet above the ocean, the current is very sluggish; in fact, so much so, that it is called "Aqua Muerta," or dead water; while half-way down the river, where the current was at least four miles an hour, the elevation was only 80 feet above the sea. But, according to M. de Puydt, the elevations ought to have been exactly the reverse.

The PRESIDENT said the author of the paper did not tell us that he took either aneroids or other instruments with him; and of course his heights could not be relied upon. But he must say the paper was calculated to excite public interest in the region explored, and to create a desire for proper survey of this region.

2.—*Notes on the Physical Geography of the Belize River.*

By S. COCKBURN, Esq.

[Extracts.]

As one of the Commissioners in the late expedition up the River Belize, it struck me that I might take the opportunity to make, in passing, some observations on the physical aspect of the localities we had to visit, which, though not the immediate object of the Mission, might still, I thought, prove not altogether devoid of interest. Unfortunately I took with me no instruments save a portable aneroid barometer, which, however, behaved very well, and enabled me to arrive at conclusions with tolerable accuracy, though the whole perhaps would require verification; for, in the absence of any statistics on the subject, I had solely my own observations to rely upon: the deductions therefore are the very best approximations possible, and can only serve as a basis of comparison on any future explorations.

The maps of the country are very incorrect, but on careful admeasurements of several Spanish maps of Guatemala, &c., I make the watershed of the river 90 miles by 30, equal to 2700 square miles, and, allowing 100 inches of rain to fall over that area annually (by no means too much, for it often rains in the interior, the mountains and forests attracting the clouds, when not a drop falls here, and the average rainfall in Belize for the last four years is $67\frac{1}{2}$ inches), it will give no less than 39,128,161,745 gallons, equal to 17,467,929 tons.

I find the length of the river from Belize to the fork at the "Branch," allowing for sinuosities, to be 150 miles; the two branches to their imaginary source, estimated at 30 miles; the creeks, many of which are now dry, 220 miles. Then at "Orange Walk" it is 187 feet wide, and 3, 6, 9, 6, 3 feet deep at different parts across. At "Young Girl" it is 180 feet wide, and 6, 10, 6 deep. Higher up, at the "Branch," it is 100 feet broad, and 3 and 6 deep; and lower down it is 200 feet by 8, while at the "Haulover" it is 600 by 10, and from the new road across it is 420 by 12, and at the Belize Bridge it is 121 feet from side to side, by 8, 11, 6 deep. Besides these there are some pools and basins 20 and 25 feet deep. Taking the mean of all these measurements (allowing only

100 miles \times 10 \times 12 feet for the *present* state of the tributaries with their lagoons) we have 2,007,073,600 cubic feet, equal to 12,500,289 gallons, or 55,840 tons of water *at present* in the river; deduct this from the rainfall, leaves 17,412,089 tons for the discharge and evaporation per year.

I estimate by experiments at the Belize Bridge and the Haulover that the river discharges into the sea by these two mouths about 5,413,680 tons per year, equal to 2276 gallons per minute; which deducted from the figures last quoted, leaves the large quantity of 11,998,409 tons due to evaporation. This is not improbable, since the discharge of some of the largest rivers is comparatively small in proportion to the rainfall, the greater part going off by evaporation, especially in tropical climes. The area of the Mississippi valley, for instance, is said to embrace 982,000 square miles, and the annual average rainfall equal to 40 inches, while the river discharges only about 107 cubic miles annually into the sea, equal to about one-sixth of all the rain that falls upon its watershed, leaving 513 cubic miles of water to be evaporated from this river-basin annually. Still other measurements should be taken during freshets and at the floods to verify my calculations. Indeed a series of continuous observations should be spread over a whole year in order to arrive at a correct estimate of the total annual discharge into the sea. But as I noted the marks left by the high water in different places on the banks, and on trees by the margin of the river, I have used them as a rough guide in the mean time.

The water at the floods rises in some places 25 and 35 feet in the main river, and in the creeks 10 and 20; and, though there are ridges intervening, the lands on the northern part of this hydrographic basin is much lower than the river: they must therefore be under water in the rainy season, and the strong current of the main river must push back the waters of many of the creeks, overflow the lagoons and inundate the whole country round. This must have happened even to Belize before the Haulover mouth was opened, for it appears to me that formerly the river discharged itself only by the embouchure at the Belize Bridge, where it must often, on a "top-gallant flood," have spread itself over large areas in the immediate vicinity, till the force of the current opened another mouth for itself at the estuary of the Haulover, and thus the delta was formed. Those lands are slowly rising, as much from the detritus brought down by the river as from the influence of gentle internal forces; and in the course of time even the lagoons will silt up and become dry, so that in *after ages* the whole will become a rich "bottom," covered with alluvial deposits of the most productive kind, in the

same manner as the present ridges were before they were elevated to their present height.

The banks on either side rise gradually as you go up, and the limestone formation crops out here and there, embedded in a concretion of coarse calcareous grit, with iron oxide, with thick layers of marl, loam, and clay, overtopped by the silt and detritus brought down and deposited by the river. The limestone thins out at the "Branch," where foliated slate appears, with joints and cleavage distinctly marked, rendering it well fitted for economical purposes. In some places the clay is mottled and variegated like Spanish soap, and in others (as at "Red Bank") it assumes a dark-red colour, from the abundance of ferruginous oxide. At "Hogstye," between "Red Bank" and "Orange Walk," a large block of pure gypsum crops out, and at "Duck Run" large boulders of indurated calcareous marl appear in the bed of the river.

There are some other rocks lower down at the rapids; and though, in the dry, the incline is very great and the current rapid, the channel being very narrow, and boats sometimes get upset in passing, yet there is no actual danger which care and caution will not overcome. There is nothing like a cataract or waterfall strictly so called, and I have no doubt that, by blasting the rocks and removing other impediments, a proper steamer might navigate as far as the "Branch" for at least six months in the year. At present the river is fordable in several places, and it sinks at the rate of six inches in the twenty-four hours; but one day it rose twelve inches, in consequence of rain having fallen in the interior the day before. It is heavy and brackish even up to "Bakers," where the tide I believe reaches, but improves as you go higher up; still, even at "Young Girl," though drinkable, it is copiously impregnated with lime. The temperature at any hour, night or day, is always higher than that of the air. I had no detached thermometer to test it by, but to the touch and feeling it always had a sensible degree of warmth.

The whole extent of the lands we traversed is covered with dense forests of timber (dicotyledons, coniferæ, &c.) and thick tangled underwood, vines, and jungle, in the wildest tropical luxuriance. The land is undulating, and rises in a gentle slope up to the base of the Blue Mountains of Guatemala.

The formation is undoubtedly of limestone of the tertiary period, but of a soft, coarse, and impure description. In fact, it is more a sort of calcareous breccia mixed with iron oxide, not unlike the *Calcaire Grossier* of the Paris basin, only that it contains no comminuted shells, and so *very recent*—nay modern, geologically speaking, as hardly to have yet acquired a consistency beyond indurated

calcareous marl. This applies especially to the portions projecting through the alluvium in the ridges, where they are granular and friable. Fragments of fossil shell (*volutæ*), with their casts, I dug up on the ridge at "Young Girl." Their analogues are to be found in existing species in the neighbouring sea, thus proving how very recent the formation is. To me it seems even posterior to the *pleistocene* of the tertiary.

Belize, 30th June, 1867.

The PRESIDENT said that some of the observations contained in this account of the basin of the river Belize were of geological interest, as they related to the amount of mud and clay brought down by the river, and the gradual elevation of the coast. The statistics of the volume of water which the author had given were also worthy of notice. Respecting the river Belize, Admiral Collinson had informed him that Lieutenant Cooper Abbs, R.N., of the *Doris* frigate, had recently explored a great part of the district, and had sent home a report of his investigations with a detailed map. He was happy to announce that the valuable geographical observations contained in this report were being extracted by Admiral Collinson, and that a memoir would shortly be laid before the Society.

Fifth Meeting, January 27th, 1868.

ADMIRAL SIR GEORGE BACK, D.C.L., F.R.S., VICE-PRESIDENT, in the Chair.

ELECTIONS.—*Joseph Anderson, Esq.*; *John Anderson, Esq.*; *G. F. Angas, Esq.*; *Capt. H. Barber*; *W. E. Blair, Esq.*; *Richard Davis, Esq.*; *Capt. F. J. A. Dunn*; *C. F. Ellis, Esq.*, Lieut. R.A.; *William Falconer, Esq.*; *A. Fyfe, Esq.*, M.D.; *A. Gilliat, Esq.*; *J. Percival Hunt, Esq.*, M.D.; *Richard Jamieson, Esq.*; *A. Laybourne, Esq.*; *Henry Murray, Esq.*; *F. McClean, Esq.*; *B. Newbatt, Esq.*, M.A., &c.; *D. Phillips, Esq.*; *Trevor Plowden, Esq.*; *Charles S. Price, Esq.*; *H. C. Rass-Johnson, Esq.*; *Capt. G. E. Shelley*; *Alexander W. T. G. Thorold, Esq.*; *W. Walkinshaw, Esq.*; *F. M. Williams, Esq.*, M.P.

ACCESSIONS TO THE LIBRARY from JANUARY 13TH to 27TH 1868:—
 'The Treasury of Geography: Physical, Historical, Descriptive, and Political,' &c., by W. Hughes, F.R.G.S., 1867. 'The Geography of British History; a Geographical description of the British Islands,' &c., by W. Hughes, 1866. 'A Manual of Geography, Physical, Industrial, and Political,' by W. Hughes, F.R.G.S., 1867. The latest editions of W. Hughes' Geographical Works, presented by the Author. 'The Chinese Miscellany, designed to illustrate the Government Philosophy, &c., of China,' Shanghai, 1849.

'Origin of the Chinese,' Chalmers, 1867. 'Journal of the North China branch of the R.A.S.' 'The Chinese Repository,' in 19 vols. Vol. i. wanting; vol. ii. incomplete, wanting 2, 3, 4; vol. iii., parts 5, 6, and 8; vol. iv. parts 3, 4, 5, 6; vol. v. 6 and 7 wanted; vol. viii. complete; vol. ix. 1, 2, 4; vol. x. 2 and 8; vol. xi. wanting; vol. xii. part 1; vol. xiii. part 10; vol. xiv. 1 to 9; vol. xv. parts 2, 9, 10; vol. xvi. perfect; vol. xvii. 4, 6, 7, 8; vol. xix. 1, 3, 4, 8; vol. xx. wanting part 4. 'Notes for Tourists in the Northern part of China,' Hongkong, 1866. All the above presented by Mr. Trübner. 'Journey of the Shanghai Literary and Scientific Society,' 1858. An English edition of Du Halde's 'Empire of China, 1741.' Two vols. fol., wanting the maps. Purchased. 'The World Surveyed; or, the Famous Voyages and Travails of Vincent le Blanc of Marseilles,' &c., 1660. Purchased. 'Inventaire et Classement raisonné des Monuments de la Géographie publiés par M. Jomard de 1842 à 1862.' Communication de M. d'Avezac. 'The Imperial Gazetteer and Atlas of England and Wales.' Presented by A. Fullarton & Co.

ACCESSIONS TO THE MAP-ROOM SINCE THE LAST MEETING, JAN. 13TH, 1868.—Map of London showing proposed Railways and Improvements for the year 1868, by E. Stanford. Presented by the Author. French Charts (302 in number). Presented by the Dépôt de la Marine. Admiralty Chart of Santorin Island. Presented by the Hydrographic Office. Three Tracings and Three Views of Herald Island, Arctic Regions, by Capt. H. Kellett. Presented by Admiral Collinson. Chart of the Sandwich Islands, by the United States' Exploring Expedition, 1844. Presented by A. Waddington, Esq. Map of the City of Victoria, Vancouver Island, by A. Waddington, Esq. Presented by the Author. Plan of the City of Antananarivo, Madagascar, by J. Sibree, Esq. Presented by the Author. Admiralty Charts (19 in number) up to date of publication. The Hydrographic Office.

The CHAIRMAN said, before entering on the subject of the evening, he had much regret in informing the meeting that Sir Roderick Murchison, their excellent President, was confined at home by, he trusted, only a temporary illness. Much might they regret his absence on the present important occasion, from his knowledge and experience, and the great interest he had ever taken in African discovery. To his instinctive sagacity the English public are indebted for the detection of the falsehood of Moosa and the Johanna men, while his great affection for Dr. Livingstone induced him to request the Council of the Geographical Society to press upon Government the desirableness of fitting out an expedition to set all doubts at rest. The proposition of the Council, as we all know, was nobly responded to, and the expedition has now returned completely successful. He felt it necessary to say a few words in commendation of the honesty, resolution, and ability, of Mr. Young, the leader of the search-

party. Having been a member of the committee for organising the expedition, he had an opportunity of witnessing and approving the choice of Mr. Young. Mr. Young, who knew the Johanna men well, was convinced of the untruth of their story, and with characteristic intrepidity he said he would go and detect the falsehood. He was questioned on various points by the Committee, with respect to his knowledge of the route to be taken, and to none did he answer with the slightest hesitation. He calculated his daily journeys as to time and distance, from the mouth of the Zambesi to Lake Nyassa; and by the quickness of his movements he had performed the journey within the time specified. Mr. Young arrived at the mouth of the Zambesi on the 27th of July. No sooner had he entered the Zambesi than he heard that the Landee Caffres had destroyed the whole of the Portuguese establishments on the southern shores of the river, from Senna to Tette. On arriving at Senna he also learned that the Mazite Zulus had made a predator yexcursion from the north-west of the Nyassa Lake, round its northern extremity, due south or nearly so, to the very banks of the Shiré; thus threatening to cut off his communication with the Makololo at the foot of the rapids. It required no small courage and tact to persevere in the face of such dangers; but he pushed on, arrived successfully at the foot of the rapids, and, with the assistance of some men, it took him only four days to surmount the rapids and gain the southern part of the lake. Pushing on from thence against a gale of wind, in which the steel boat was nearly swamped, he ultimately arrived at a bay where he had the happiness to gain information of Livingstone, not only from negroes who had seen him, but from the Arab merchants, who informed him that Livingstone proceeded to the south end of the lake, had there crossed over, and was going forwards on his journey. Much further information was obtained at Marenga on the south-western side of the lake. This information was so convincing, that Mr. Young considered the object of his journey was in some measure answered. From the chief Marenga he learned that he had sent fifty to eighty men with Livingstone to carry on his goods towards Tanganyika; and he told him that if any accident had happened to Livingstone within a month's journey he should have heard of it. Mr. Young returned to the mouth of the Zambesi, and arrived there on the 11th of November.

The SECRETARY then read the following letter from Sir Roderick Murchison:—

“MY DEAR SIR GEORGE,

“Alas! the day when I most wished to preside over the Geographers, and when I hoped they would have given me their hearty thanks for the part I have taken in organising the Livingstone Search-Expedition, must now pass away without my daring to appear before them, on account of a rheumatic and febrile attack which compels me to stay at home.

“The document which I drew up, approving in unqualified terms of the conduct of Mr. Young, and which was unanimously approved by the Council, will be read to the meeting, and will prove to the whole assembly how much we value the services of that excellent man.

“I ask you to take the Chair for me at the Evening Meeting, and to state that inexorable fate prevents me, to my great vexation, from attending.

“You who know as well as any member of the Council how I have strenuously pulled the leading oar in bringing about this Boat-search Expedition, how I sought out Mr. Young, and how I prevailed upon the Secretary for Foreign Affairs and the Board of Admiralty to approve the design, can well understand the glow of honest satisfaction I felt when I heard of its complete success.

“Again you also can testify to the firmness with which from the first day of

the reports of the murder of my dear friend Livingstone I resisted the almost general belief; for without that resistance no Government and no Board of Admiralty would have countenanced an expenditure of money, even in search of so great a traveller and so good a man as Livingstone.

"In taking this line and in pursuing it with ardour I was well aware I undertook a heavy responsibility; but as my distinguished friend, Captain Richards, R.N., the Hydrographer, embraced the cause with equal zeal, and the Lords of the Admiralty most generously supported it, nothing remained but to pray for a successful issue, and have full confidence in Mr. Young. Our project, thanks to that excellent seaman and his companions, has been entirely successful.

"But often has my energy almost broken down when I reflected on the various difficulties to be overcome! For I well knew how many casualties might occur to prevent the expedition ever reaching the spot where, as it is now proved, the Johanna men deserted him.

"My friends of the Geographical Society will recollect that from the first I expressed my belief that the Johanna men had *deserted* Livingstone, and had concocted a false and wholly incredible account of his death.* I subsequently † gave as an hypothesis of their reason for deserting that they were coast-men, and acquainted only with the Zambesi and its tributaries, and that when their chief decided on plunging into the heart of Africa, they fled from him; and, indeed, they assigned as their motive to the native chiefs, to whom they told the truth, that it was fear which prevailed over them. Had they only re-told this story to the Consul at Zanzibar, what sufferings of the friends of Livingstone would they not have averted, instead of bringing on themselves the execrations of everyone! I hope some measures will be taken to make these wretches feel that, in reporting to British authorities, they must speak the truth.

"To put together a boat constructed in sections, to find a negro crew for the navigation of the Zambesi, to take the boat to pieces, and have it carried up 36 miles along the sides of the Cataracts to the River Shiré; then, after navigating the waters until the fate of Livingstone was clearly ascertained, to convey her back to the Zambesi, and finally bring her and the party safe back to England without the loss of a single man; this, indeed, is a real triumph.

"Now, indeed, we have only to rejoice, and, in the fullest confidence that the white man seen on the west shore of the Lake Tanganyika was Livingstone, I look with the deepest interest to the arrival on the east coast of the Arab to whom Livingstone entrusted letters from the Consulate at Zanzibar. When these letters arrive we shall know whether the great traveller has followed some large river to the west coast, or has crossed eastwards to Zanzibar; or whether, indeed, he may not have it in view to work northwards into the vast tributaries of the Nile.

"In regard to these three hypotheses I may add that Dr. Kirk at Zanzibar, in a letter dated 30th November, which I have not communicated to the Society, states that, though anxious to come home himself, he says, 'But I will not stir until I see our dear friend safe out of Africa.' Hence I infer that Dr. Kirk thinks that, having once determined the problem of the waterflow of Lake Tanganyika, Livingstone will cross over to the east coast.

"It is a source of deep vexation to me not to be present on this occasion, when I should have had it in my power to express personally the great obligation we owe to the Board of Admiralty; and I am sure that the Society will unanimously return thanks to their Lordships for their truly liberal and judicious support of the expedition as recommended by our Council."

* See 'Proceedings,' March 11th, 1867.

† 'Proceedings,' vol. xii. p. 23.

The SECRETARY then read Mr. Young's Report :—

To Sir Roderick Murchison, Bart., K.C.B., &c.

SIR,—I have the honour to lay before you a brief outline of the proceedings of the Expedition under my command, sent out to Africa by the Royal Geographical Society for the purpose of ascertaining the truth or falsehood of the reported death of Dr. Livingstone. I am happy to inform you that our efforts have been crowned with success, and I have satisfactory evidence that Dr. Livingstone was not murdered by the Mizitu, nor by any other tribe, at the place named by the Johanna men, but had gone on in safety far beyond. I have also satisfactory evidence that the Johanna men deserted shortly after leaving Marenga, returning by the same route as they had gone.

But I must first begin the narrative from the time of our landing at the mouth of the Zambesi. Immediately on landing I succeeded in getting a negro crew to take the boats up as far as Shupanga, where I arrived on the 2nd of August. I at once engaged a fresh crew to go on to Chibisa, and the next day started for Senna. Arrived there on the 6th; found the Portuguese authorities very obliging; made what arrangements were thought necessary, and proceeded on the next day. I learned from the Portuguese that the Mizitu were in full force on the Shiré, and were threatening Chibisa, so I arranged with the authorities at Senna to send on to me at Chibisa (should I require them) 100 men, fearing, as the Mizitu were there, I should not be able to get the Makololo to accompany me.

We arrived at Chibisa on the 17th, and found that the reports about the Mizitu having been there were quite true, and that they had been down in force to the left bank, robbing and burning the houses, murdering some of the people they caught, and taking others prisoners. The Makololo put off in canoes from the opposite bank and shot three of them. Of course I was quite unprepared to meet the Mizitu in this part of the country.

The Makololo, as well as the people who were of the old mission party, received us gladly. I requested the Makololo to attend the next morning, which they did, when I acquainted them with the object of my mission. They agreed to accompany me on certain conditions, which I agreed to. One was that I should leave some ammunition behind with those that remained, so that should the Mizitu attempt to cross the river below the Cataracts they would be well able to encounter them. After arrangements had been completed, we started on the 19th for the Cataracts; arrived the same day, and at once began taking the boat to pieces. Hitherto all had

gone on well, but no sooner had we got the boat to pieces, and everything was ready for the journey overland, than fresh reports about the Mizitu reached the Makololo, which very much daunted them, and had also a tendency to lower our spirits, for without their help we could do nothing, as it was not only their help that we required, but also that of their people, they being the chiefs of the country round about. After a good deal of persuasion the whole affair was settled to our satisfaction, and on the evening of the 23rd the Makololo appeared in force with about 150 men.

We started next morning with the boat, provisions, luggage, &c., making in all 180 loads. The men worked well, and we arrived with everything in good order at Pomfunda, above the Cataracts, in four and a half days. The heat during the journey was excessive, even for Africa. We at once commenced rebuilding the boat, and everything appeared to be going on well when fresh reports reached us about the Mizitu. We were visited by some of the Ajawa chiefs who had been driven out of their own country, and were obliged to cross the river to save themselves from being murdered. There was an encampment, close by the place where we were building the boat, of about 200 Ajawa, the sole survivors of the once powerful people under the chief Joey.

Every day fresh reports reached us, and the Makololo wanted to return home, which of course I could not consent to. At this place we first heard from a native of a white man having passed through Maponda at the south end of Lake Nyassa. He stated that he had seen him, and gave a description of his dress, &c.

Launched the boat on the 30th, and started up the river next morning. The Makololo not working well, and making every excuse, not being well, &c., thinking perhaps we would turn back. They stated that the risk was too great, that there was little chance of our ever returning, but as they had gone so far they would go on and die with us; of course all was agreed to. As we proceeded on we found vast numbers of Ajawas and Machinkas on the left bank, living in temporary huts, who had retreated before the overwhelming numbers of Mizitu. Reached the small lake Pamalombe on the evening of the 5th of September.

During our passage up the river heard several reports that a white man a twelvemonth before had stopped at Maponda for some time, having crossed from the opposite side, and that after resting there some time he had gone on in a westerly direction. I now felt almost convinced that it must have been Livingstone, but I almost feared to stop there, for I felt certain had the Makololo been satisfied that it was him they would have gone no further; for my agreement

with them was, that as soon as we had satisfactory evidence that the Doctor had gone on in safety, or that he had been killed in the way described by the Johanna men, I would return with them immediately. But now, as it appeared that he had passed over the south end of Nyassa instead of the north, I wanted to find out where he had first struck the lake. The Makololo stated that they were certain that if a white man had been killed, or had died within a month's journey of where we were, we should certainly have heard of it before we got thus far.

The next morning crossed the Pamalombe, but could not find a passage in to Maconda, owing to the quantity of rushes and grass, and it blowing very hard at the time we made for the river. Here again we met great numbers of natives, who appeared very hostile. They lined the banks with their guns, and demanded that we should come into them. The Makololo appeared very much afraid, so I laid the boat to, to await the approach of two armed canoes that had shoved off from the shore. I soon made matters right with them, and shortly afterwards entered Lake Nyassa, and slept the first night on the Rock Boasuum.

Started the next morning with a fine breeze for the east side of the lake, steering as near as possible for the Arab crossing-place, as laid down by Livingstone. We had not run more than two hours before a heavy gale began to blow, and for three hours we had to run along the coast to try and find shelter, but the rocks and breakers met us at every hand. This proved the finishing stroke to the Makololos' courage, who all laid down at the bottom of the boat to die, and although the boat was constantly shipping heavy seas, they refused to bale out the water. The steel boat behaved well, but was far too deep for the stormy Lake Nyassa. At length, after three hours' weary watching, we succeeded in finding a sheltered spot where we stopped to dry our clothes. Only one native appeared at this place, who when he saw us first was much frightened; but as soon as we stated we were English he willingly came towards us. He told us an Englishman had passed through his village a year ago, and that he had come from the Arab settlement, and had gone south to Maconda. Started again for the former place, but found the distance too great to reach before dark; put into a small sandy bay, where we found some natives fishing.

I must here remark that at any place, on first visiting it, no one was allowed by me to get out of the boat, except myself, Mr. Faulkner, and the interpreter. I soon got into conversation with these men, when they spoke of a white man who had been there, without being asked. They stated that he had first made that place

coming from Makata, had stopped nine or ten days to rest, and then went north to the Arab settlement to try and get them to carry him and his party across the lake, but after waiting there some time he returned, making his way south for Makata. They described his dress, what luggage he had, imitated him taking sights, and sleeping under a mosquito curtain, and stated that he had a dog with him named Chetane. They said the head-man of the carriers was named Moosa; two of the boys spoke the Ajawa and Mananja language, and were named Juma and Wako. They told us what barter goods he traded with; on being shown an album with numbers of likenesses, they at once recognised the one of Livingstone. That there were nine of Moosa's countrymen with him, who did not speak either the Ajawa or Mananja language. He did not buy slaves or ivory; he had come to see the country. Besides numerous other things that left no doubt on my mind that it was Livingstone.

Next day we arrived at the Arab settlement, where we were received kindly, and found all that I had heard before was quite correct. Livingstone waited at this place nine or ten days for the Arab boat, which did not arrive, so he started south again, and they traced him as far as Maponda. I visited the house Livingstone lived in during his stay, and I purchased a few articles (all English make) that he had traded with, such as small round looking-glasses, a knife, razor, iron spoons, &c. Of course most of the calicoes, &c., were already worn out, but the chief still possessed an Indian manufactured scarf that Livingstone had presented to him on leaving. I sent two of the most trustworthy Makololo with my ever faithful interpreter (whom I brought from the Cape) on the road to Makata to see if that was the road he had come, while we again went south, making short marches inland, to try and find the route the Johanna men took in going back, as they had not visited this place or the last. We obtained other trifling articles in the shape of barter goods, and while waiting for the return of the Makololo obtained from a chief further south an English Common Prayer Book, which he stated had been left behind by the Englishman in the house he had slept at.

On the 13th the searching party returned, having gone two days' march on the road to Makata. Livingstone had come that way. They brought back some glasses, fish-hooks, &c., that he had traded with. They would have gone further, but were ill-treated by some of the natives and driven back: their reason for so doing, they said, was that the Englishman had brought fighting into the country, for the Mizitu had been killing their people ever since he left.

Sept. 14th.—Started for the opposite side of the lake, made for Chinsamba's. Although we started with little or no wind, it again blew a gale before we reached the opposite shore. We found that Chinsamba had been killed some time since, and nothing remained of his village. Skeletons now met our eyes in great numbers, whenever we landed along this side. Saw several natives the first day, both Ajawas and Mananja; and those who had not seen the white man further south had heard of him, but not in a single instance was he spoken of as being dead. I wished to learn, by coming over this side, in what direction he had gone after leaving Maponda. We had not crossed long when we saw a man who had helped to carry the Englishman's luggage for two days; he described him as before. This man had been living inland some distance, but had been driven out by the Ajawa. He pointed in a north-westerly direction, and stated it was five days' journey off, which, of course, would be very much more from Marenga.

Our progress south was slow, owing to the heavy gales of wind. On our way we met several who had seen the Englishman, and more than one had helped to carry his luggage from village to village, and there was not in all their reports the slightest variation. They were not all from the same place, but they all maintained that he had gone on in a north-westerly direction towards the Loangwa. These natives were full of complaints about their neighbours, and would only have been too ready to inform against each other if Livingstone had come to an untimely end at either of their hands, and they all maintained that the Mizitu had never been in that part of the country.

Sept. 19th.—Reached Marenga. Seeing the boat approach the shore they lined the beach with their guns, &c.; but, as soon as we told them we were English, they laid their arms down and welcomed us. I at once asked to see Marenga, when I was conducted up to his house by one of his wives. Marenga rushed towards me, and, seizing me by the hand, shook it heartily, saying, "Where have you come from, and where is your brother that was here last year?" and as soon as I told him I had come to follow him, he began and told me all he knew of him. He said he had come there from Maponda, had stopped there two days; he was very kind to him, making him presents, &c., and he in return gave him what food he required. Livingstone gave him medicine, which was done up in doses; the papers he used formed part of a 'Nautical Almanack' for the year 1866. He lent Livingstone four canoes to take himself and luggage across the marsh, while the Johanna men carried the remainder round. He had seen him before; he said he saw him

when he was up here with a boat a long time ago. He traced him a month's journey off, giving the names of the places in the same order as I had previously heard. He was quite willing to give me any guides to go to Maksuro, or where it once was; but he stated, as I had previously heard, that Maksuro had been driven out and killed by the Ajawa and his people almost annihilated: as also had Cóomo, two days' journey beyond. Marenga stated that the Johanna men returned after being absent two days. They gave as their reason for returning that they had merely agreed with Livingstone to take his goods as far only as they liked. The head-man stated that he had been in that direction before with him and had met the Mizitu, and that they were going no further. To prove their independence they passed themselves off as Arabs. Marenga gave them food, and they slept there one night and then set out for Maponda.

Marenga is a Babisa, and rules over a populous district; he made us a present of a bullock and as much native food for our crew as we required, and he invited us to remain a long time. He has a great number of wives—I and Mr. Faulkner being introduced to forty, who were all sitting round him.

Having satisfied myself thus far, I asked him if he thought it possible that Livingstone could have died a month's journey off, and he not know it? He at once said No, and had he died three months off he should have heard of it; but as soon as I told him I had heard that the Mizitu had killed him not far distant, he laughed, and said he told me he was going the way to avoid them, and that the Mizitu had never been in that part of the country described by the Johanna men.

Marenga then sent for a man who had gone five days' journey with him, and when he returned the Johanna men had gone back. I had previously heard the same account from the same man.

The Makololo now got very impatient to return home, and nothing was talked of day or night but the Mizitu. They stated that they had fulfilled their engagement, but I very much wished to try and get to the north end of the lake. But they would not listen to it. No inducement I could offer would persuade them to go; so there was no alternative but to go round to Maponda, get what information I could, and return.

Marenga was full of complaints about his neighbours, and what he wished for more than anything else was medicine for his guns, so that if the Ajawas came to fight him his shot would kill some one every time they were fired. We, being satisfied that Livingstone had gone on in safety, started on the 20th for Maponda, calling at the several places along the coast to gain what informa-

tion I could ; but all I obtained only went to confirm what I had previously heard.

Arrived at Maponda on the 25th. The chief himself was not at home, having gone on a trading expedition, leaving his mother to act during his absence. Immediately on arrival I sent a messenger to acquaint her of our arrival and my wish to see her. She soon came, with a train of followers, bringing us presents of native food and beer. She stated that an Englishman had been there a year before, had stopped three weeks to rest his party, and then left for Marenga, stopped there a day or two, and then left to go to the Loangwa, calling at Maksura, Cóómo, &c. One of the boys was left behind here, being unable to travel, having very bad feet and legs, but had now quite recovered and had gone with Maponda. She stated that the Englishman had left a paper with him, but that he had taken it with him on the journey. She brought some books belonging to him, one of which had his name on ("Wakitane, from Dr. Wilson, Dec., 1864," &c.), which she allowed me to take. The Johanna men returned this way, stopped one day, and proceeded on. She swore, in the presence of us all, that Maponda did not take away their guns, neither did any of the party die there. She stated that the Englishman was great friends with her son, and that if any one had molested him (even Marenga, as strong as he was) he would have gone to war with him. The old lady laughed at the idea of Livingstone having been killed by the Mizitu. Mr. Faulkner questioned her regarding the havildar. She gave a description of a man with straight black hair, with the top of his head shaved, &c. Mr. Faulkner states it answers the description of the Indian very well. Marenga also told us the same, and I felt convinced had he died there we should have heard it from some of the numbers I questioned on the subject.

The Makololo now told me that if I intended going into the lake again, they were not going with me ; and, being entirely dependent on these men, there was no alternative but to return and to get their aid in carrying the boat back. So, having got all the news I could at Maponda, I decided on going to Makata ; but although I offered a large amount for a guide, no one would attempt to cross the river. They stated that Makata had taken to the mountains for fear of the Mizitu, and they were afraid of being cut off.

Started for the Cataracts on the 27th. Found the same state of things along the river as on coming up. Arrived at the Cataracts on the 2nd of October, and commenced taking the boat to pieces. Meanwhile we heard from Chibisa that the road was clear, and that

the Mizitu had made Chore, not far from the lower Shiré, their head-quarters.

Oct. 8th.—Started for Chibisa with the boat, luggage, &c. ; where we arrived on the 12th. We found the boats safe, and the men left with them in very fair health. Again built the steel boat, and while there repaired the graves of the late missionaries who died there.

22nd.—Started from Chibisa.

26th.—Arrived at the Ruo, stopped and repaired the grave of the late Bishop Mackenzie. Arrived at the Kongone on the 11th of November, but on our way down we visited Senna.

H.M.S. *Racoon* arrived on the 2nd of December.

Arrived at the Cape on the evening of the 17th.

Embarked on board the mail-steamer on the 19th.

In conclusion, I must again state that this is but a brief outline of our proceedings. I should have liked to have done more by going to the north end of the lake, but was prevented by circumstances unforeseen when I left England ; for, had the Mizitu not threatened Chibisa, I should have had little difficulty in getting the Makololo to accompany me. Under the circumstances, I hope that what has been done will meet with your approval, as well as that of the Royal Geographical Society.

I have the honour to be, Sir, your very obedient servant,

E. D. YOUNG.

Mr. YOUNG then addressed the meeting. He said he thought enough had been stated in his Report to convince any one that Livingstone was safe, but he would endeavour to add some further details. He would begin by saying that they had a pleasant passage to the mouth of the Zambesi, and that they had no difficulty in obtaining the aid of negroes to man the boat, the English being well remembered in this region since the expedition of Dr. Livingstone. They started the day after their arrival up the river, and arrived at Shupanga, 90 miles distant, in four days. At Shupanga he visited the grave of Mrs. Livingstone, and had it renewed ; and proceeded the next day to the Portuguese settlement of Senna, where he learned that the whole of the Portuguese had been driven from the southern side of the Zambesi by the Landeen Caffres, who were formerly kept quiet by the payment of a subsidy by the Portuguese. At Tette 130 of their troops had been killed, together with three European officers, and the Governor had been taken prisoner and afterwards killed. At Senna the inhabitants had all removed to the northern shore of the river and were living in temporary huts. The Portuguese authorities received him well and entered into an arrangement to send him a number of negro labourers, in case he should find the Makololo unwilling or unable to transport his boat past the cataracts of the Shiré. On leaving Sena he passed into a new channel which had been made two years previously by the Zambesi overflowing its banks and forming a new river, connecting it with the Shiré and so shortening the distance from Senna very considerably. The main channel between the mouth of the

Shiré and Sena has become blocked up and the water taken off by this new river, which enters the Shiré close to Morombala. He had rather a tiresome journey up the Shiré. There were plenty of mosquitoes and plenty of mud-banks; but the men worked well, and in good time they reached the Ruu River, where he visited the grave of Bishop Mackenzie and had it renewed. At Chibisa they were received gladly not only by the Makololo but by the people of the old mission party; they came from miles round, and as the boat approached they were standing on the face of the hill, a black mass of people, ready to welcome them: on arriving at the beach they rushed in and seized the boat, exclaiming, "The English, our fathers, have come to see us again." They said Dr. Livingstone had been very kind to them; while he was there he was their father, and then they added to Mr. Young, "you are our father now." The next morning he met the Makololo chiefs and arranged with them for the services of 150 of their people, that is, their negro subjects, to carry the sections of the boat past the Cataracts—a number of the Makololo themselves to continue with the expedition until tidings of Livingstone were found. Upon reaching the Cataracts and taking the boat to pieces the Makololo became alarmed at the prospect of an attack from the Mizitu, and were inclined to refuse to go any further: on arriving above the Cataracts they again wanted to return home; the risk, they said, was too great—they had nobody to protect their wives and families from the Mizitu during their absence. He told them their lives were not of more value than his own. They thought they were. He asked them why. They said, "If you are killed, there are plenty of Englishmen to protect your wife." He told them if their wives were killed they could get more, and perhaps he could not. However, after a good deal of persuasion, they went on, but they did not work well and were as sulky as possible. But when they got further away from home and there was no chance of their going back, then his turn came, and he threatened to stop their wages and to give them extra work if they were not obedient. After this they got on pretty well together until they reached Lake Nyassa, where the motion of the boat in a gale of wind was so disagreeable to them that the Makololo crew all disappeared at the bottom of the boat, and nothing could induce them to get up, not even the threat of being thrown overboard. They said, "We may as well die now as by and by, for you are sure to kill us." There was nothing talked about but the Mizitu taking their wives and burning their houses down. When they had reached the end of the cataracts of the Shiré he began to hear reports of a white man having passed that way some months ago. He was satisfied from the description given that it was Livingstone who had crossed the south end of the lake. But as he was anxious to ascertain where Livingstone struck the lake, and what route he had followed, he would not stop at Mapunda, which lies at the entrance, but determined to run up to the lake at once and call at Mapunda on his way back, for if he had received decisive news at Mapunda, the Makololo would have considered their engagement terminated and would have insisted on returning to their homes. He made for the Arab crossing-place, but before they reached this part of the lake, on the eastern side, he called at two places. At the second place he met with a negro who described the dress of the white traveller; his mode of taking observations; and, in answer to questions put to him, said he had some boxes, one of which in particular was very curious, as it contained "white water" that would not wet your fingers. He was asked what the white man used the "white water" for; he replied that he placed it on the ground and looked up at the sun, and that he put up a stick which he had to the sun and then looked down it to the "white water." This man also described a watch he had seen in the traveller's possession, and said he had a little dog with him about which there was something curious, for it was said to have two tails. The negro informed them where he slept, said he knew Moosa well, adding that he had nine of his countrymen with

him; he also knew the two boys, Juma and Wako, and said Wako was the tallest. He (Mr. Young) learned here that the boy Wakotani, who was supposed to have deserted Livingstone at Mapunda, had been laid up with a bad foot and left behind by Livingstone. The searching party then re-embarked and went on to the Arab settlement, on the eastern side. They learned that Livingstone had been there and had tried to cross the lake at that point. He had waited for the Arab boat, which was away on the opposite side, for ten days, and then continued his journey southward to Makata. Having obtained all this information, the party crossed to the opposite shore of the lake to find out if Livingstone had travelled northwards by that side. It was found that he had not passed near the shores of the lake. Everybody they interrogated pointed nearly in the same direction, namely, towards the west. At Levate they saw one of the men who had helped to carry Livingstone's luggage for two days. He described him in the same way as the people had described him on the other side of the lake, not omitting mention of the dog the traveller had with him. The party next made their way to Marenga, situated in the south-western bight of the lake. The people at Levate knew nothing about Marenga, and could not direct them to it; all they knew was it was somewhere down the lake. All these people would have readily informed against their neighbours if Livingstone had been maltreated or come to his end in this district; but in no single instance was the traveller spoken of as being dead. Marenga was an important place to visit, as they wanted to ascertain whether the statement of the Johanna men about being ferried by Marenga over the marsh was correct. They found it was marshy there; for the first night they had to sleep in the marsh, not being able to reach Marenga by daylight. The chief of Marenga gave Mr. Young all the information he could about Livingstone, and was exceedingly kind to the searching party. He had only seven bullocks in his possession at the time, and he gave one of these for the Makololo. These men were so hungry that fourteen of them managed to eat the bullock in three days; but then they did not require any more food for a week afterwards. If the Makololo had been willing to go forward he should certainly have continued his voyage to the northern end of Lake Nyassa. The risk, indeed, would have been great of being too late for the passage of the cataracts of the Shiré, which are not safe after the 1st of November. If the floods overtook them in November they would have to remain up the country another twelvemonth, for the river rises between the cataracts more than 100 feet. Having obtained all the information they could, they made their way round to Mapunda, and the information they obtained there corresponded exactly with what they had heard before at Marenga. He found that Wakotani had really been left behind here, as reported, but he was then absent with the chief. A book of his was given to Mr. Young, with the owner's name in it, and he now exhibited it to the meeting. He had no doubt that the white man thus described in the same terms by so many independent witnesses was no other than Livingstone; and when the Doctor himself returned in the course of time, he believed the correctness of the information he (Mr. Young) had obtained would be confirmed. This was the principal part of what he had to say. The scenery of Lake Nyassa was grand and the depth of water considerable. At some places it was 140 fathoms, and a few hundred yards distant from the shore, at the Arab crossing-place, it was 95 fathoms. Still it was full of rocks, and the navigation was dangerous; at the same time there were plenty of snug little bays along the coast, if you knew where to find them. Some of the cataracts between the Upper and Lower Shiré are also very grand. In conclusion, Mr. Young said this expedition, if it had done no other good, had left a good impression upon the minds of those who never before knew the English. Some of them had merely heard that the English at one time had been fighting their countrymen, the Ajawas. He asked one of the chiefs if he

would allow his men to take the boat back, with all the provisions, for the same wages he gave going up. The chief said he wanted some of the wages paid before they started. Mr. Young said he had none with him; but if they liked to take the boat down he would pay them according to agreement, and they consented to do so. The wages were, for taking the boat up past the Cataract, and returning, about 150 miles altogether, the men finding their own provisions, eight yards of calico, value three shillings. He could not afford to give more, the boat would not carry a sufficient amount of goods for larger payments. They had 180 carriers going up and 170 coming back. They worked well both to and fro. He was certain if he were to go there again, and had a boat three times as big, he should have no trouble in getting her carried up in a week; and should he be called upon for a like purpose for the good of his country, he did not suppose he should be against going.

The CHAIRMAN said the simple, plain, and graphic narrative of Mr. Young seemed to him to carry conviction with it. The mercury, the compass, the artificial horizon, the sextant, the watch, and the book, together with many other circumstances mentioned by Mr. Young, were "proofs as strong as Holy Writ" of the safety of Livingstone. He would now propose, and he did it with infinite pleasure and satisfaction, a vote of thanks to Mr. Young. Seeing near him one of the companions of Mr. Young, it would be interesting to the meeting to hear any observations that he might wish to make.

Mr. FAULKNER said that after the distinct and detailed account given by the Chairman, and the interesting remarks added thereto by Mr. Young, any observations of his regarding the actual expedition would be superfluous; but there was one part of the journey he might make a remark about. Coming down from the lake into the Shiré, he left Mr. Young and the boat to have some hunting ashore; and on one of these excursions, after bathing in a stream, he was seized with a stiff neck. The chief of the district had never seen a white man before, and he wished to present him with a young lady. He sent one of his men with him into a kind of yard, where there were two females grinding corn—one a nice-looking girl, and the other an ugly old woman. He was about to speak to the young lady, when the man said, "You must not talk to her; you must talk to the chief." They returned to the chief, who, having asked if he liked her very much, told him to go and catch her—meaning that he should go and put a rope round her neck and take her away, as the Portuguese did. He, however, expressed his disapproval of such a proceeding by going away in a pretended rage. He went down to the river-bank, and, while he was having his luggage conveyed across, down came the chief with the girl, a rope tied round her arm, saying he had brought her to him. The girl seemed to be in the greatest terror. When the interpreter came, he desired him to say to the chief he would show him how the English treated slaves, and thereupon he cut the rope with a knife and released the girl. She fell at his feet fainting, and she afterwards told him that her own sister had been sold away, and she was always in a fright lest she should be sold into slavery. He found extensive and beautifully-cultivated cotton plantations along the upper part of the Lesungue River. The Manganja holds this part of the country in peace. At another place, the chief would not allow him to enter the village, though he had sent word to say he was coming and wanted to buy provisions. It occurred to him to take out his cornopean and play upon it. In five minutes there was not a man to be seen; they ran off in all directions, and he walked into the village and found it perfectly empty. He had killed some half-dozen fowls and had been there about half an hour when an old woman came up, and did not seem to fear him and his companions at all. He remained in the village two days, playing the cornopean almost incessantly. He met with some good elephant-shooting on the Upper Shiré, and he ascertained the fact that an African elephant can

be killed with a single shot just as easily as an Indian elephant, with the exception of a shot straight between the eyes, where the tusks grow, *i. e.* provided the sportsman goes close to him with a good gun and plenty of powder. On one occasion he came upon five elephants; and in less than three minutes four of them were dead. He shot the last within five yards of him, charging, and as it fell it struck the barrel of his gun, knocked him down, and broke the stock of his gun. In conclusion, he was glad to have the opportunity to thank Sir Roderick Murchison for permitting him to accompany the expedition; and also to thank Mr. Young for his kindness on many occasions in allowing him when he went on these hunting excursions to take what provisions he pleased.

The Rev. HORACE WALLER (formerly lay member of Bishop Mackenzie's mission) said he had not the slightest doubt that Mr. Young had traced Livingstone for many days' journey beyond the point where the Johanna men deserted, and he was in hopes the Doctor was now far away to the northward. The Makololo would certainly have known of Livingstone's death, if it had really occurred at the southern end of Nyassa. The chiefs told Mr. Young all they knew about Livingstone. In that circumstance there was the best evidence of his safety. Had anything occurred to Livingstone there would have been silence on the subject. The idea with these chiefs is that they are responsible for any harm that happens to a traveller anywhere in their neighbourhood; and the chief of Marenga telling Mr. Young at once that Livingstone had been there and had gone on in safety, showed that he could speak of him with a clear conscience. The mention made of the dog, he thought, identified Livingstone in a singular way. When Bishop Mackenzie was in the country, he (Mr. Waller) had a dispute with Livingstone about a passage in Buffon's Natural History, in which it was stated that the tail of the dog curled to the left. Livingstone was fond of any playful dispute of this kind, and he took the greatest pains to find out all the dogs whose tails turned to the right. Now, it was very likely he and the boys (who had lived for years with Mr. Waller) had met with a dog whose tail curled the right way for the Doctor: then the old joke would revive. The boys would be always talking of the "crow" they would some day have over their former friend, and it was quite easy to see that an attempt to explain the fun to the other natives had given rise to the story of a dog with two tails. This seemed the more probable, because it was only current in the villages where they had remained long enough to chatter to their hearts' content. Other natives spoke of the dog, but merely honoured him with the usual allowance of tail. There was no doubt, from what Mr. Young had told him, that the English name maintained all its old fame in that part of the country. It was most gratifying to those who had been in the country before to hear that the whole country side came down to meet Mr. Young, and that on the lake the English were thoroughly understood. The Portuguese were understood also, but that was all to the bad. Allusion had been made to some further attempt to stop the slave-trade in that part of the country. Livingstone wished the attempt to be made on Lake Nyassa. Mr. Young had proved that in seven months out and home he could make a voyage to that lake, and that a small vessel could be taken up with the greatest ease. Now, he had no hesitation in saying that a party of plucky Englishmen might go up there and do more good in stopping the slave-trade than all her Majesty's cruisers would do on the coast. The Sultan of Zanzibar received tribute on 20,000 slaves last year. All these slaves had come from the Nyassa district. Livingstone had a tremendous journey before him yet. He had no doubt he had gone to the west to examine the small lake he had formerly heard of south of Tanganyika. He believed he would then go to Lake Tanganyika, and that we should next hear of him at Alexandria.

Sir SAMUEL BAKER said, as an African traveller, he felt the greatest pleasure in being a listener, and applauding all that he had heard. But after the remarks that had just fallen from Mr. Waller, he felt it was his duty to give an opinion. As Dr. Livingstone was last seen with only nine armed followers, it was almost impossible we could expect him to come through by Alexandria. He rather hoped that in a very short time we should hear that he was on his return to Zanzibar. At the same time it struck him as an extraordinary fact, that we had heard so much of Livingstone, but, unfortunately, nothing *from* him. Therefore he would recommend the meeting not to be buoyed up with too much hope. He confessed he had none last year; but now he was more sanguine, because it had been proved most satisfactorily that Moosa and the Johanna men had told lies. There was one thing he felt inclined to suggest, although there were no means to carry it out. In the Geographical Society they were in the habit of bestowing honours wherever they were due; but they had no power to bestow punishment. Moosa and the Johanna men had deserted Livingstone, and had put this country to some expense in the search for Livingstone, to say nothing of racking the hearts of those who were near and dear to him. Lions, panthers, and cats of all kinds, were produced in Africa: but there was one other "cat" which he wished could be sent out to the Consul at Zanzibar and administered to these men, and that was the British "cat-o'-nine-tails." He must abstain from giving an opinion with regard to Livingstone's movements, because every step in Africa depended upon circumstances. All they could do was to trust that in a short time they should receive some official communication from Livingstone himself through the Consul at Zanzibar.

The CHAIRMAN, in reply to the observation that no intelligence had been received from Livingstone himself, reminded the meeting that Dr. Kirk in his last communication stated that Livingstone had sent letters by a native trader who was delayed on the way; and by this time the trader might be at Zanzibar. At all events, Sir Roderick Murchison was in early expectation of news to that effect.

Sixth Meeting, 10th February, 1868.

SIR RODERICK I. MURCHISON, BART., K.C.B., PRESIDENT, in
the Chair.

PRESENTATIONS.—*J. A. B. Horton, Esq., M.D.; W. Rhys Williams, Esq., M.D.; Herbert Evans, Esq.*

ELECTIONS.—*Rev. T. Concy, M.A.; Edward Cook, Esq.; H. M. S. Graeme, Esq.; Major E. Hunter; H. F. Makins, Esq.; Captain C. H. Riley (Madras Army); A. R. C. Strode, Esq.*

ACCESSIONS to the LIBRARY, from 27TH JANUARY to FEBRUARY 10TH, 1868.—Knolles' 'Turkish History,' folio. Pocock's 'Arabia,' 4to. Pearce's 'Abyssinia.' Light's 'Nubia.' Rhodes' 'Jerusalem.' Le Blanc's 'Voyages.' Duhalde's 'China,' in two vols. folio. All by purchase. Blackie's 'Imperial Gazetteer;' Fullarton's 'Imperial Gazetteer and Atlas.' Donors, the Publishers. 'Description of Darien in 1754,' translated from the Spanish by J. Power, Esq.

Donor, the Translator. Townsend's 'Journey across the Rocky Mountains.' Purchased. 'Life of Prince Henry of Portugal, surnamed the Navigator, and its Results.' By R. H. Major, Esq. Donor, the Author. 'Banking in Persia,' by Delacy O'Brien, Esq. Donor, the Author. 'An Introduction to the Study of National Music,' by Carl Engel. Donor, the Author. 'Report of the Trans-Himalayan Explorations (Topographical Survey of India), 1865-67,' by Captain T. G. Montgomerie. Donor, the Author.

ACCESSIONS TO MAP-ROOM SINCE THE LAST MEETING.—New Zealand.—A Map of the Northern Island, showing the scene of the Military Operations of 1863. Presented by the War Office, through Sir E. Lugard. Africa.—A Sketch Map, showing the Track of Mr. Young and Party in search of Dr. Livingstone, 1867. Presented by Mr. Young. Two Maps of South Africa. Presented by A. Petermann. Route Map of Abyssinia, showing the advance of the British Expedition of 1863. Presented by the Topographical Office, through Lieutenant-Colonel-Cooke, R.E. America.—A Map of the Argentine Republic, showing the Provinces of Tucuman and Catamarca. Presented by A. Petermann.

The PRESIDENT said that although to his deep regret he was prevented by illness from being present at the last meeting of the Society, at which the complete success of the Livingstone Search-Expedition was happily recorded, he expressed to the Society by letter his sincere gratification at the result, and suggested as the most probable hypothesis that the great traveller would come out of Africa by Zanzibar. For, supposing that he had determined the great problem of the outflow of the waters from Lake Tanganyika, whether to the west or to the north, that problem being solved, he would not, he thought, with his small force, attempt to force his way through the kingdoms of Equatorial Africa, and make his way to the Nile. He wished, however, to say that if, through any advices we may receive, it should transpire that Livingstone had resolved to try to pass to the north through Equatorial Africa, in that case the Society might rest assured that the Council would be prepared to make every effort to organise a relieving expedition from Egypt, with the aid of the Viceroy, and probably according to a plan which has been suggested by Sir Samuel Baker.

The Paper of the evening was,—

On the Exploration of the North Polar Region. By Captain SHERARD OSBORN, R.N., C.B.

WHEN last I had the honour to address this Society touching Arctic Discovery and Exploration—on January 23rd, 1865, just three years ago—I submitted the following propositions, and endeavoured to convince you of their importance, and the comparative certainty and safety with which our conclusions might be carried out.

In the first place I argued, and still maintain the importance, in a generally scientific, and especially in a geographical point of

view, of an exploration of the area around the Northern Pole of our Earth.

In the next place I maintained, and strenuously do so still, the desirability, in a national and naval point of view, of keeping open that school of enterprise and adventure, combined with scientific research, which Arctic and Antarctic voyages have ever offered to British seamen in times of peace—a school of hardship and endurance, a field for men who will lay to their hearts the great truth, that

“For sluggard’s brow the laurel never grows,
Renown is not the child of indolent repose”—

a scene of action in which in by-gone times were trained the hardy seamen and officers who broke the power of Spain when she aspired to crush this England of ours—and is still a field for active service, more than ever needed for our navy, when armoured war-ships lie months in harbour for a few hours at sea, and a dead level of mediocrity, from an especial education and uncompromising routine, threatens to destroy the individuality of my profession, and to leave the junior grades without one glimpse of hope beyond the coat-tails of some great admiral, which they are to grasp if they can.

Lastly, I argued that, although there were, I owned, three routes by which the unknown Polar area could be reached—viz., by Spitzbergen, by Behring’s Straits, and by Baffin’s Bay—I showed what I considered good grounds for saying that the last-named route—via Smith’s Sound and Kane’s Channel—afforded the best hopes of success, because the farthest known land was nearer the Pole than the Spitzbergen Isles; because there was every reason to think that the land extended still further north in Smith’s Sound; because animal life, and the existence of Esquimaux in that high latitude where Kane wintered were additional guarantees for the health and comfort of our explorers; and lastly, because from Smith’s Sound to Upernavik (a Danish settlement in Greenland) a certain boat-voyage could always be made every season, so as to insure communication with England annually. For all these reasons many of you concurred with me in thinking that the Baffin’s Bay route was the right one. Unfortunately for the speedy resumption of Arctic research at that time, an eminent German geographer, M. Augustus Petermann, came forward with a theory in favour of the existence of a passage for ships to the Polar area somewhere between Nova Zembla and Greenland. He urged, in the face of all our bygone experience, that as the Gulf-stream must flow into the Polar Sea, by following its course a watery highway would assuredly

be found. I fully recognised at once the serious nature of the difficulty, so opposite an opinion from one so deservedly eminent as Augustus Petermann would occasion. It was like trailing a red herring across a breast-high scent; and I own that a split took place in the Arctic camp, of which advantage was taken in official quarters, to say to your President as well as to me, that so long as Arctic authorities could not agree as to the best route to the Pole, Government were not likely to entertain any such project; and there were many who chuckled in triumph at the difference of opinion which enabled the dear old navy to hobble on its macadamized highway of crossing royal yards and adhering to routine.

Grieved though I was to defer the prosecution of my idea, I felt anything was better than to see in these days ships go on a Polar voyage, via Spitzbergen, and return empty-handed. I preferred, therefore, to be patient, confident that the Swedish Royal Expedition would tell all I anticipated of open water in that direction, and that the yearly travels of our steam whale-ships to Baffin's Bay would throw additional light on the Smith's Channel route.

To-night, with your kind permission, I propose to show what additional proofs I can of the merits of the Baffin's Bay route for the exploration of that great area within the 80th parallel, which is just a week's steaming* from our coasts, and contains one million one hundred thousand square miles† of unknown sea or land.

Dealing first with the Spitzbergen route, let me say that I fully recognise the importance of a ship or ships being sent to follow up the course of the Gulf-stream, that mysterious river of warm water flowing through the wastes of the ocean, and to which we owe, under Providence, our blessed immunity in Great Britain and Norway from the paralysing rigours of a Labrador winter; that stream, equal to fifty Niles in volume and length, ought—for a thousand reasons, which I will not pause to dilate upon—to stimulate the sailors of this sailor-nation to explore it from its fountain-head to where it debouches or recurves amidst the solitudes of the frozen North. Full of interest are its mysteries, and I sympathize with the learned President of our Royal Society, as well as the German philosophers, who would place it as a subject of prior importance, scientifically speaking, to mere geographical exploration. But I submit that wherever we penetrate the Polar area, we shall strike upon the Gulf stream in some shape or the other—from Melville Island to Nova Zembla down every channel have minor branches of that stream been encountered, on every shore has it left its mark in

* 1200 miles from the Shetlands.

† Miles square, 1,131,000.

drifts and wrecks carried from many a foreign land, and I plead, Let us explore first; then let knowledge be perfected by men of perhaps greater scientific acquirements than the sailor-officer. I want to be sure of the *expedition which first goes on this work getting well into the area before us and safely back again*. Therefore it is that I reiterate my objection to the Spitzbergen and Nova Zembla route for England's *first* essay with steamer and sledge to explore the Polar area.

No one, except a groggy Dutch skipper, ever got, I say, north of 80° on the east side of Spitzbergen, and on the west Scoresby's highest once, in a lane of water, was only $81\frac{1}{2}^{\circ}$ N. latitude. In both cases the hindrance consisted in endless fields of ice streaming ever southward. Parry, in 1827, was told that, if he launched boats over a certain extent of ice-field, he must reach open water. He toiled in 1827 with his gallant crews in this endeavour. What he marched a-head one portion of the day, he was drifted back by the southerly action of the ice, and only reached $82^{\circ} 45' \text{ N.}$, when he desisted, beaten by the ice-drift: had there been land or fast-floe he might have succeeded. It may be said, Let it be tried when the autumn arrives, and the summer's ice-drift shall have left open water for ships. I reply, Remember the latitude you are dealing with.

If you are in earnest in wishing to see Arctic exploration pursued by our sailors, until the secrets of the Polar space are laid bare to human knowledge, we must not commence by a rash Polar voyage.

"Pas à pas on va loin" is a thoroughly sound Arctic motto. Send, if you please, a good steamer to trace out the autumnal ice-edge and limits of the Gulf-stream between Nova Zembla and Spitzbergen, and establish a small party of ten persons for a *winter's sojourn*, to procure meteorological observations at the north extreme of each of those places; but make your first deliberate essay towards the Pole elsewhere, where there is less risk to life, more certainty of success.

Although, for reasons to be presently explained, I shall refrain from saying one word to dissuade other nations from taking either the Behring's Straits or Spitzbergen routes in the united attempt I desire to see in 1869, of an exploration of the Pole, still in justice to all concerned, and as our duty as geographers, we must place on record the results of the experience of recent sound observers and explorers in the neighbourhood of Spitzbergen and Behring's Straits.

Hear what the Report of the transactions of the Royal Swedish Academy of Sciences says of the result of three scientific expedi-

tions, since 1861, to Spitzbergen, touching the probability of a water-channel being found north of that island :—

“ During the last years the idea has been vindicated that the Polar basin is composed of an open sea, only here and there covered with drift-ice. The learned geographer Dr. Petermann has even asserted that it would be as easy to sail from Amsterdam Island ($79^{\circ} 47'$) to the Pole, as from Tromsø to Amsterdam Island.

“ This view is in itself so contrary to all experience that it scarcely merits refutation ; but as different prominent English Arctic navigators seem inclined to adopt the same view, in spite of the experience gained by their own numerous Arctic expeditions, we will here give some of the most important reasons against this supposition.

“ All who for a longer period have navigated the northern seas, whalers and Spitzbergen hunters, have come to the conclusion that the Polar basin is so completely filled with ice that one cannot advance with vessels, and all the attempts that have been made to proceed towards the north have been quite without success. Passing by older voyages, we will here only mention the following. In 1773 Phipps made an attempt to reach the North Pole by way of Spitzbergen, but cruised the whole summer, as late as the 20th of August, north of Spitzbergen, without being able to reach the 81st degree of latitude. In 1818 Buchan and Franklin repeated the same attempt, but without reaching a higher latitude than $80^{\circ} 31'$. The ice was high and closely packed ; no navigable aperture was observed in it, and the ships were considerably damaged. Scoresby, who for so many years cruised in the waters between Spitzbergen and Greenland, succeeded only once in attaining $81^{\circ} 30'$, without any possibility of advancing further north, although a considerable aperture in the ice was seen extending from east to west. In 1827 Parry endeavoured to push forward from Spitzbergen to the Pole in boats drawn on sledges. He advanced on closely-packed broken ice to $82^{\circ} 25'$ latitude ; he could from this point, on the 23rd of July, not see any trace of open water to the north (Parry, ‘ Attempt to reach the North Pole,’ pp. 100-105), and encountered on his return navigable water first at $81^{\circ} 34'$ (p. 118).

“ Torrell and Nordenskiöld ascended, during the expedition in 1861, on the 23rd of July, a high top on Nordeast Land, Snøtoppen ($80^{\circ} 23'$ lat.), without being able from that height to see trace of open water to the north of the Seven Islands. A few days later, when the ice between North-east Land and the Seven Islands was separated a little, they could push forward as far as to Parry’s Island, though they, even from the highest tops on these islands (1900 feet, $80^{\circ} 40'$ lat.), could see nothing but ice northwards.

“ From the top of White Mountain, at the bottom of Wijde Jans Water (3000 feet) we could, on the 22nd of August, 1864, not see anything but ice between Giles Land and Spitzbergen. Some vessels that had the same year attempted to sail round North-east Land were shut up by ice, and had to be abandoned by their crews. Before leaving the ships, an attempt was made to sail north, in order to return this way to Amsterdam Island, but they were soon met by impenetrable fields of ice.

“ Notwithstanding a high prize has been offered for the reaching of high degrees of latitude, none of the whalers, who else sail boldly wherever the hope of gain allures them, have considered it possible to win this prize. They would certainly not have neglected to make an attempt, had it been possible, as Dr. Petermann asserts, to sail to the Pole in three or four weeks.

“ We have had opportunities of speaking to most of the masters of vessels sailing to Spitzbergen. They make their richest booty during autumn, and stay, if possible, at Spitzbergen till September or the beginning of October. At this time they are accustomed to visit Møffen (80° lat.) in order to kill walrus

on land. They testify unanimously that, although the packed ice at that time of the year sometimes moves from the coasts of Spitzbergen, yet that the ice-blink that appears in the north, and the rapidity with which the ice at northerly winds comes down, evidently proves that the distance between the southern border of the ice and the north coast of Spitzbergen cannot even then be very great. The northern ice-fields are, even in autumn, quite close.

"All experience hitherto acquired seems thus to prove that the polar basin, when not covered with compact, unbroken ice, is filled with closely-packed, un-navigable drift-ice, in which, during certain very favourable years, some larger apertures may be formed, which apertures, however, do not extend very far to the north. Older narratives by Dutch whalers, who are said to have reached 86° or 87° , nay even $89\frac{1}{2}^{\circ}$, must therefore be received with the greatest diffidence, if not looked upon as pure fictions, and the prospect of being able to advance with vessels from Spitzbergen to the Pole is no doubt extremely slight. It would be particularly unwise to choose the spring for such an attempt, and the passage east of Spitzbergen. At that time and by that passage it would be difficult, if not impossible, to reach even 78° of latitude. Whereas, on the west side, one can every year depend upon reaching the 80^{th} degree of latitude, and in favourable years it might be possible, in September or October, to sail even a couple of degrees higher."

If Mr. Otho Torrell were here to-night he would, I feel sure, be able to tell you how fully these results of the investigations of the Swedish expeditions bear out the opinions I gave him in London; those opinions being, as I have said, based on the experience of the three previous centuries by our seamen and navigators. I have merely to add that the French, in their publication entitled '*Renseignements Hydrographiques*'* fully support these opinions.

However, M. Petermann, I am bound to say, thinks otherwise, and he is supported in his views by some of the most eminent men of science in this country, who, like M. Petermann, assert that the Gulf-stream must open a highway for a properly equipped steamer through the Polar pack, and that it has only to be fairly tried to be successful. What is better still, the attempt, I have reason to hope, will really be made, and from a quarter which gives, in the quality of its seamen and the earnestness of its people, every chance of faithful devotion to the object in view. I wrote to M. Petermann the other day, pointing out that, if we could only be agreed as to the division of the labour and the routes towards the Pole, Germany taking one, France another, and America and ourselves another, that I thought our common object—Polar Exploration—would be successfully accomplished. That gentleman, I am bound to say, met me in the kindest and frankest manner; and, after upbraiding me for calling him a philosopher in my letter to the '*Times*'—a crime

* See '*Renseignements Hydrographiques*,' Paris, 1866, p. 186. Published au Dépôt des Cartes de la Marine. Par A. Le Gras, Capitaine de frégate.

which I beg to say I was unwittingly guilty of, and am most sorry for—M. Petermann says:—

“I lose no time in sending you word that, for the execution of a German expedition to the North Pole, M. Rosenthal, of Bremerhaven, offered me his excellent span-new screw-steamer the *Albert*, of 450 tons, last September; and, to make the expedition still better found, he last week, in addition, offered me a second smaller steamer, the *Bionenkorb*. The expedition is to be got up for 1869, and, to take for its basis, the sea between Greenland and Nova Zembla.”

Now, this looks like work, and God forbid we should do anything than help these gallant Germans in their enterprise, and the young navy of the great Northern Confederacy could not have a nobler or better field on which to win its laurels.

Let us next turn to the Behring's Straits route, a route which our Gallic allies are bent on essaying. The Geographical Society of Paris, I learn from its talented secretary, M. Charles Mannoïr, takes a lively interest in a fresh effort to explore the Polar seas; and the enlightened Emperor of the French has been one of the first to encourage the project laid down by M. Lambert. I feel sure they will carry with them our best wishes, and that this Society will not stint praise or honours for all they may do in that direction. Herald Island marks on that chart the furthest known land our ships had ever reached into the Polar Sea by that highway; and until to-day all that was known beyond rested on an official report, which runs as follows, from Captain H. (now Rear-Admiral) Kellett, dated August 17, 1849, Behring's Straits:—

“Still more distant than this group (*the Herald Isles*) a very extensive and high land was reported. There was a fine clear atmosphere, except in the direction of this land, where clouds rolled in immense masses, leaving occasionally the very lofty peaks uncapped, where could be distinctly seen columns and broken summits, which is the characteristic of the higher headlands in this sea—East Cape and Cape Lisburne for example. It becomes a nervous thing to report a discovery of land in these regions without actually landing on it, after the unfortunate mistake to the southward (‘Wilkes's U. S. Expedition to the Antarctic Regions’); but as far as a man can be certain who has 130 pairs of eyes to assist him, and all agreeing, I am certain we have discovered an extensive land.”

He then adds that the land he saw was probably a continuation of the land mentioned to Baron Wrangel by the inhabitants of the Siberian coast as being occasionally seen from Cape Yakan. Wrangel therefore first heard of this new land, and Kellet first established its existence, as far as his modesty and caution would allow him to claim it.

Last year, no less than four enterprising American whaler

captains * saw this land again, and give us certain points well fixed by astronomical observations.† I am indebted to our distinguished president, Sir Roderick I. Murchison, for by far the fullest account of these discoveries; they are carefully laid down on the chart before you, and the records are concisely as follows:—

Captain Long, of the *Nile*, says he saw the new land on the 14th August, 1867, about 18 miles distant. By good observations he made the west extreme visible to be in lat. $70^{\circ} 46' N.$, long. $178^{\circ} 30' W.$ The lower portions of the land were entirely free from snow, and seemed as if green with vegetation. Broken ice between the land and ship precluded a nearer approach. The *Nile* sailed easterly along the land all the 15th August and part of the 16th, but did not approach it nearer than 15 miles at any time.

The 16th August was a clear day; had a clear view of the land; made the S.E. extreme point by good observation to be in lat. $70^{\circ} 40' N.$, long. $178^{\circ} 51' W.$ Saw a mountain in about long. 180° , which looked like an extinct volcano, and by rough measurement was 2480 feet high, and from the *Nile's* decks mountain ranges were seen extending northerly as far as the eye could reach.

Captain Bliven, of the *Nautilus*, says he saw land north-west of Herald Island extending as far north as lat. $72^{\circ} N.$, and whilst cruising in $71^{\circ} 20' N.$, long. $175^{\circ} W.$, he traced lofty mountains in this new land extending to the north-west.

Captain Raynor, of the *Reindeer*, says he sailed along a new land, which had only been previously marked on his chart as *extensive land with high peaks*, and by good observations he placed a cape to the south-west in lat. $70^{\circ} 50' N.$, long. $178^{\circ} 15' W.$, and another cape to the S.E. he places in lat. $71^{\circ} 10' N.$, long. $176^{\circ} 40' W.$ The land about this south-east cape he describes as high, rugged cliffs and barren grounds, and the coast beyond it turns north-west for 15 or 20 miles, and then north and north-east to the north of $72^{\circ} N.$

Mr. Whitney, in his letter to Sir Roderick Murchison, says: "After many enquiries among the officers of the whaling fleet, the correctness of these statements is *fully confirmed*," and adds that "*one shipmaster who has been as far north as $74^{\circ} N.$, and nearly due north of Herald Island, could see peaks and mountain ranges far to the north-west of his position.*" We may safely, therefore, place this land on our charts; and, in general terms, I may add that it lies about 70 miles distant from the Siberian coast; that the coast has

* Long, of the *Nile*; Raynor, of the *Reindeer*; Phillips, *Monticello*; Bliven, *Nautilus*.

† See 'Pacific Commercial Advertiser,' published in the Sandwich Islands at Honolulu, together with the editorial remarks of H. M. Whitney, Esq.

been closely traced for 100 miles, and sighted here and there for 500 miles; that the south face visited seemed more fertile than the Siberian coast—drift-wood was seen, and abundance of walrus. The sea, though only 15 to 18 fathoms deep 40 miles off the land, was singularly blue, and it only needed a screw-steamer to have easily effected a landing.

Some of our enterprising American captains felt convinced the new land was inhabited, and Captain Long says he is assured of it, for on a cape a little westward of and opposite to Cape Yakan, he noticed an immense number of upright and prostrate columns, like obelisks or landmarks, and that “they were scattered over a large surface, and in clusters of 15 or 20 each, with intervals of several hundred yards between them.”

The existence of an island in 170° w. long., about north-west of Point Barrow, with a channel separating it from this new land, is likewise reported. Thus you see, brother geographers, in spite of the “masterly inactivity” of the British navy since M’Clintock’s voyage in the *Fox*, knowledge of the Arctic zone is still progressing, and to American sailors belongs the credit of verifying the report of a Polar land north of Siberia, as told to Admiral Wrangel in 1820 by the Tschùktchi tribes of Cape Yakan, and a glimpse of which was first seen from H.M.S. *Herald* in 1850.

It is satisfactory to know that human knowledge does progress, though Britons may begin to despair of our part in conquest over man, or over nature; and we may say to the Dame Partingtons who put on their pattens and flourish their mops because we will not rest and be thankful,—a fig for your scolding, the world will keep moving.

Now, it is towards Behring’s Straits that the attention of French geographers has been directed by the persevering advocacy of M. Gustave Lambert, and he, it is said, will be ready to start on his exploration of the Polar area by that route early next year or late in this. So that, with the violets of 1869, we may reasonably hope to see the sailors of Germany striking northward, on the one hand, and those of France on the other. Surely you will feel with me that we should be playing our part at the same time, and by the route which of all other sbelongs to the sailor explorers of our race—Davis Strait and Baffin’s Bay. There, since our navy turned from a field in which it had honourably distinguished itself from 1818 to 1860, the enterprise of Americans in geographical exploration, together with the introduction of steam-power amongst our British whalers sailing from Hull, Dundee, Aberdeen, and Peterhead,

have contributed much to dispel vague difficulties and dangers really incident to Arctic navigation in the dear old-fashioned sailing-ships.

Since 1855 there is not a season in which British screw-whalers have not navigated Baffin's Bay. There is hardly a season in which vessels have not voluntarily wintered on the western shores of Davis Straits in the hope of a good cargo of fish-oil by autumn or spring fishing.

The introduction of steam as an element of safety and success in Arctic navigation was due to the English navy, and that fact, together with the information we gave, of how to winter with health and comparative safety, was turned to account by our intelligent brethren of the whaling fleet, and to the advantage, I believe, of an important branch of commerce and school for seamen.

When I tell you, therefore, that not only have whaling men recently voluntarily wintered on the west land, but that their wives have in several cases done so too, I maintain that the Arctic feat is robbed of half its terrors. Mr. Penny, of Aberdeen, has been accompanied by his wife more than once; as recently as 1867, some ladies returned from a winter in Exeter Sound. And, after all, why should not English wives go with their husbands to latitudes where Danish ones have cheerfully gone for years? But are Englishmen going to tell me that where these poor women dare to go for love you will not go for honour and zeal, and that what will add to our country's honour and the extension of human knowledge entails a risk which the adventurers should shun? You will say, may be, that such a region is only intended for an Esquimaux to exist in, that the European must perish on such a dietary in such a climate. I point to the American Mr. Hall, who, encouraged by the generous support of Mr. Grinnell and his friends in New York, has subsisted, since May 1860, for nearly seven years, in regions immortalised by the sufferings of Frobisher and Hudson of old, and rendered memorable in our times by the achievements of Parry, Back, Lyons, and Rae.

Knowledge has indeed been power to the men of to-day—ably have they availed themselves of it, whether it be such as the *Queen*, of Peterhead, who in 1866 wintered between Lancaster and Jones Sound in safety, those who this year returned from wintering in Exeter Sound, or those ships of America and Newfoundland who made a summer trip to Repulse Bay in search of whales, and left Hall encamped there last August—all attest how much further we are in advance to-day of the secret of voyaging and sojourning with impunity in those seas than we were thirty years ago.

The fact is, they have our Arctic experience to help them—good steamers, good charts, and a thorough knowledge of the land and the shelter harbours afford, from Cape Farewell to Smith's Sound: more than that, these fishermen and Mr. Hall have all found much aid and comfort from the supplies afforded by the natives who have, on both sides of Baffin's Bay, been found as high as any one has wintered; and it is this, together with the known abundance of animal life up Baffin's Bay and Smith's Sound, which makes me urge it as the proper highway to the Polar area. For believe me, the mere *coup de théâtre* of hoisting a flag on the spot called our Pole and singing "Rule Britannia," or "Hail Columbia," is not the object of my efforts.

You must bear in mind that, so far as English attempts to penetrate up Smith's Sound are concerned, no expedition has attempted it, and no *steamer* can be said to have fairly entered it before the *Arctic of Dundee*. Baffin, in 1816, sighted the entrance in a sailing-craft of 55 tons. John Ross did as much in 1818, in a bigger ship. During the search for Franklin's expedition I sighted its portal in a screw, the *Pioneer*, but at a distance; Inglefield, in a small-power screw-vessel, the *Isabel*. He advanced just within the entrance, laid down the shores very roughly, by eye-sight. He says of this strait, "My own impression is that there was nothing on the east shore that would have prevented our steaming through." Next came Dr. Kane, in the *Advance* sailing-brig, deep laden, and blown about by the strong gales of such a funnel between two seas, and he was followed by the sailing-schooner of Dr. Hayes, who was not able to reach, in so frail a craft, as far as Kane, and wintered, as you see, at a spot southward of Kane's position.

Therefore, I repeat, this route has never been attempted by any expedition under the conditions which we now know constitute the true elements of success: 1st, a good steamvessel, and 2ndly, such resources in sledges and men as shall enable autumn and spring journeys to be accomplished without wanton risk to life, and a certainty of careful exploration.

Recently, it is true, a ship in search of whales did enter this strait,—the *Arctic of Dundee*; and all honour, I say, to him, and those fishermen of America as well, who in their adventurous calling do not hesitate thus to tread on the heels of, and in some cases surpass, the Arctic explorer. Captain Wells' affidavit is as follows—the italics in brackets being my insertion, to explain the statement to those not conversant with the localities.

STATEMENT of Captain RICHARD WELLS, of S.S. *Arctic*, Dundee, Season 1867.

"On June 19th, passed Conical Island (*Crimson Cliffs of Beverley*). There being much ice in the country, we had to pass between it and the mainland. Made fast for a short time to the land-ice off Petrowack Glacier, and rode out a gale of wind from s.s.w. (*by compass*).

"Then steamed close along the land, there being no land-floe. Passed Cape Athol with two ships' lengths. Two natives came on board. Got into open water. Passed between Rocks Dalrymple and Arabella.

"Then steamed to the westward, but found the ice a very heavy pack, impenetrable. Carry's Island then in sight.

"Followed the-ice edge along, which led us once more back to the mainland (*Greenland*). Went ashore at Cape Parry, and saw open water to the north, off Hakluyt Island. Made fast to the land-ice in Whale Sound, and had seven natives on board from Netilik (*see 'Kane's Voyage and Report of H.M.S. North Star.'*)

"Next day steamed past Hakluyt Island within quarter of a mile of it. Got into open water, and steered west true. No ice to be seen from the masthead to the north.

"Made the land-floe on the west side of Smith's Sound, off Talbot and Cadogan Inlet—very heavy ice. The pack to the southward jammed lightly in upon it (*the land ice*), and impenetrable.

"Made fast to this west land-floe, and saw numbers of white whales, bears, seals, unicorns, and walrus.

"Thence sailed north in search of fish. The land in sight, high and bold on both sides, continued northward until we opened out Smith's Sound; Humbolt Glacier being in sight, through the glass, from the masthead.

"When we tacked and came to the southward, there was no indication of ice to the northward; the sky blue and watery, and only a few small streams of light ice to be seen.

"We were then to *the best of my belief*—no observation having been taken—about 79° N. latitude.

"Stood to the southward to attempt a passage to Pond's Bay, and were for several days dodging about in this north water. A heavy breeze occurred from the north, which raised a considerable sea, so heavy that we were compelled to hoist our boats close up. I believe that had we not been upon a whaling voyage, and I should have continued my course to the northward had I seen a fish, we should have met with no difficulty in attaining to almost any extreme northern latitude.

"This report has been dictated by me, and to it I append my signature this 25th day of November, 1867.

(Signed)

"RICHARD WELLS, Master.

"On board S.S. *Arctic*, Dundee."

I am indebted to our worthy associate Allen Young for this record.

Thus you find a whaler steamer in "open water" very early in the season in Smith's Sound. Inglefield found it open—Kane was stopped by no impenetrable barrier in his first entry. He only, in my opinion, needed steam-power, for the ice was all in motion—now going south, now north.

Let me now call your attention to this diagram of Smith's Channel and Kane's discoveries. Mr. Petermann has shown it in three dif-

ferent maps. I give it you in one, with the kind assistance of Captain George, of this Society. The black line is Dr. Kane's, in 1855; and the red line is Dr. Hayes' alterations of Kane's work.

The discrepancy between Inglefield and Kane is easily explainable. The former was steering about for a day, just inside the entrance of the Strait; he never landed, could not and did not profess to make a survey, and only made a very usual mistake for Arctic novices—he over-estimated the distance he could see. Dr. Kane's winter quarters are, I believe, excellently fixed by his astronomer-in-chief, poor Mr. Sontag; and Kane, at page 384, vol. ii., gives, in his table of positions, no less than five other places as fixed by positive observations by double altitude and artificial horizon. I am, therefore, utterly at a loss to understand on what grounds Dr. Hayes alters and stretches out his coast-line of the western coast, without giving us any data to justify his proceedings.

Capes Hawks, Prescott, and Frazer are all fixed astronomically, Dr. Kane tells us, and Cape Andrew Jackson likewise. I therefore say, until Dr. Hayes produces his observations, we should adhere to Kane's chart.

I never had a more difficult task in my life than to try to understand from Dr. Hayes' journal what he did on his journey from his ship to the Polar Sea and back again. I was in hopes of being able to say I am satisfied that he has traced the land even farther north than Kane thinks it exists. All I can be sure of is that he says he reached a point which agrees with Kane's Cape Cracroft, and that he saw a headland farther north, some 60 miles off, or in latitude $82^{\circ} 30' \text{ N.}$, whilst he was in $81^{\circ} 35' \text{ N.}$

It is a great pity that Dr. Hayes, in his anxiety to make a pleasant book for reading, should have destroyed the simple character of his daily journal, so as to prevent anyone tracing his daily work. He alludes to certain observations as having been sent to the Smithsonian Institution of Washington. I believe this Society has applied for copies of them. I hope they will be accorded, as they will solve many interesting geographical questions.

But, correct surveying apart, Dr. Hayes gives us other information, which he did understand, of an interesting nature; and I should not have alluded to the accuracy of his map had it not been a matter of importance in the subject before us to know on what facts it was asserted that a future explorer would have the ground cleared before him to such and such a latitude.

The temperatures recorded in Dr. Hayes' winter quarters confirm the fact often observed by other Arctic voyagers in high latitudes, that during the winter, in heavy northerly or north-easterly

gales, the temperature rose with the violence of the storm, and fell immediately the gale subsided. This, in Smith's Sound, as at Northumberland Sound and Griffith's Island, merely, I suspect, tells a tale of a disruption of the surface of the ice-covered seas beyond the Arctic traveller, and warm vapour rising from those storm-beaten spaces.

He did reach Cape Hawkes in the spring, and at Cape Frazer, opposite the centre of Humbolt Glacier, found Esquimaux ruins, and again at other points found more traces. On his return, the natives insisted that had he gone further he would have found the west-land Esquimaux. Lastly, Hayes, like Kane's people, was stopped by open water in the throat of the Strait.

His Esquimaux friends on the east side said he would find on the west land traces of more of these people, and that if he went far north he would come to living natives and good hunting-grounds, with "plenty of musk oxen."

Thus again, I say, here you have a continuous land as far as man has gone or seen, that land of the same geological type of the Melville Island, which we have elsewhere found to be so abounding in deer and musk oxen; we have every reason to think the natives will be found there. All travellers have been stopped by water—mark that!—and that sea yielding what will support human life or contribute to the health and strength of our seamen.

That north-water I will not dignify by the term open Polar Sea; experience of former "open waters" warns me against doing so, though I pray that Kane's memory may hereafter be immortalised by the confirmation of his hopes and opinions. All I ask is now, explore it! A little whaler saw the road clear to it last August, as I have told. Inglefield saw no impenetrable barrier in his way for a steamer; at any rate, blocked or open, the north water is to be reached, if not in ship, with boat and sledge. M'Clintock computes that 40,000 miles of sea and land were explored in search of Franklin by boat and sledge, without the loss of one sledge or boat party. I only ask that as much be done in the cause of science and for the sake of our navy as was done from motives of humanity, to try and save the only explorers who have perished during a century in those regions.

Much has been made of the peril incurred, much of the loss of Franklin and his 100 followers, alas! I fear for a purpose. I remember the sheaves of gallant men I have seen laid in their narrow graves in feverish China; I know of the thousands thrown to the sharks of the Gulf of Guinea, in order that political capital might be made of such services at home. I saw more stout men struck

down by yellow fever during a few weeks we were connected with that Stock-jobbing concern called the Anglo-French Mexican Expedition than ever perished during twenty years of Arctic service. And are you going to tell me that after that, when the State needs it, you would hesitate to-day more than yesterday to risk us? Then as to expense, all I say is, it has been grossly exaggerated. I may tell this Society—in strict confidence, or you will get me into a terrible scrape—that a screw two-decker was built all the quicker and all the cheaper at Woolwich Dockyard because such a windfall as the Arctic Expedition of 1850-52 happened to fall in. It is a great mystery. I dare not explain it to you. Dismiss, therefore, any fears about expense and risk. Let us combine and be earnest. Official opposition, if it exist, like the maids of Ismail, waits only for proper pressure: it will be coy, perhaps frown, but will yield nevertheless. The sums voted for the navy, from the last Government Arctic expedition in 1855, for the following ten years—say from 1854 to 1864—was *only* 115 millions sterling. And how much do you suppose out of those 115 millions were spent in the cause of science? Just 686,000*l.*, or less than the one hundred and sixty-fourth part of our naval vote. This includes, remember, the maintenance of the Royal Observatory at Greenwich, and the prosecution of surveys throughout the world. 686,000*l.* out of 150,000,000*l.*! Is it not but as Falstaff's "one halfpennyworth of bread to this intolerable quantity of sack"? and am I to be written down as wicked as Oliver Twist for asking for more?

I will not detain you longer. In my previous paper, which I have reprinted for distribution, you will find the way described in which to carry out this great work of Polar exploration. I have little to add—nothing to take from it; and I only ask this Society to give its President and Council a unanimous vote in favour of the resumption of Arctic expeditions, under Government auspices and encouragement. Sir Roderick Murchison will, as he has ever done, stand stedfast to his colours as the great promoter of geographical adventure, and friend of every earnest and faithful traveller; and with your unanimous vote and active support we, who are of the Committee of the British Association appointed for the furtherance of Polar research, shall be able, I doubt not, to convince the public, as well as our Admiralty, of the wisdom of our completing geographical exploration, and our old flag again wave ere long in frozen seas.

The PRESIDENT said Captain Sherard Osborn had given a very lucid, broad, and fair view of the probabilities and desirabilities of Arctic exploration. He had advocated the subject with the true-hearted feelings of a sailor; not, as it

was stated in some of the newspapers, with a view to his own employment, but with a view to the glory of the British navy and to the education of our naval men, for the approaching expedition to Antarctic regions, to observe the transit of Venus over the sun. Nineteen-twentieths of the discoveries made in the Arctic regions were due to British exploration, and it would be a blot on their escutcheon if they did not maintain the lead in extending our knowledge of the Arctic regions. The proposal to send an expedition by the route between Spitzbergen and Nova Zembla, as advocated by M. Petermann, did great honour to the German nation. Let the Germans do all they could; and it was desirable that the French, who proposed to reach the Pole by Behring's Straits, should succeed in their efforts to organise an expedition; but let not the British navy be behind in these great enterprises. He had received a letter upon this subject from M. Petermann, which he would read, as he thought it was due to that gentleman that he should have the credit of having pointed out, long ago, the existence of a large extent of land near the North Pole:—

MY DEAR SIR RODERICK,

"Gotha, 7th February, 1868.

"Our expedition is to be ready to sail at latest by the beginning of May, 1869. Meanwhile a depôt of coals is to be formed in Spitzbergen, by directly sending there a shipload of coals as soon as possible in the course of *this* year. A small reconnoitring expedition like that of Lamont, Lord Dufferin, Newton, Birkbeck, and others, is also, if possible, in the course of *this summer*, to proceed to lat. 75° on the *eastern coast of Greenland*, the farthest point attained there, and thence to push on northwards along the coast in the footsteps of General Sabine's and Captain Clavering's expedition. I consider this part of the Arctic work as one of the main points remaining to be settled there. The weather and temperatures that expedition experienced from the 1st of August to the middle of September, 1823, must strike every one as remarkably favourable and inviting to explorers, compared with other Arctic regions in the same or even lower latitudes.

"The reconnoitring party to Eastern Greenland will very likely be headed by Lieut. Karl Weyprecht, of the Imperial Austrian navy, an experienced and most excellent officer in every respect, who for several years has devoted his attention to the Arctic question, and who yesterday came to see me, about the undertaking, all the way from Pola in the Adriatic. I wrote further in detail about Eastern Greenland to General Sabine on the 18th December.

"Regarding the recent discoveries of Captain Long and other American whaling captains, I beg to draw your attention to the fact that the high and extended land in $73^{\circ} 30'$ N. lat. and 180° long., as discovered by Long, *exactly coincides* (auf ein Haar) with the land I have for many years laid down and stuck to in all my maps. I enclose a copy of my last map, where you can see for yourself, I have stuck to the land in spite of all that was brought against it. You are aware that it was reported on for upwards of 200 years: first by Michajlo Stadurtius in 1645, who then founded the Russian settlement of Nishne-Kolymsk, then by Andrejen and a host of others. But Baron Wrangel did everything to throw discredit upon it, simply because he did not attain it himself. Kellett in 1849 discovered Herald Island and saw the land, but Captain Rodgers in the U.S. ship *Vincennes*, from his exploration in 1855, maintained that the land thus seen and Plover Island laid down by Kellett had no existence.

"I always, however, stuck to it, and perhaps you will kindly do me the favour and give me the credit of the corroboration of the correctness of my Arctic views regarding the Arctic Central Land thus far, in your opening remarks on

Monday, for which purpose I beg to offer you the free use of the whole of the foregoing remarks.

"I have the honour to remain, my dear Sir Roderick,

"Your most faithful and obliged servant,

"A. PETERMANN."

He had also received a letter from his Excellency Admiral Lütke, a circumnavigator of the globe himself, and President of the Imperial Academy of Sciences at St. Petersburg, who was exceedingly interested in this question:—

"The land which the whalers have seen and coasted recently to the north of Behring's Strait, must be that which, according to Wrangel, is perceived sometimes from Cape Yakan. It certainly does not belong to the continent of Asia, because Dechneff and others were able to pass from the mouths of the Kolyma to Behring's Straits in navigating along the Siberian coast. This land to which one of the whaling captains (I think Long) has applied the name of Wrangel, is therefore an island or group of islands like New Siberia (Nouvelle Sibérie). There is no reason why these lands may not extend to Greenland, which perhaps they may touch. It is much to be desired that some of the whale-ships which have steam-power might continue an investigation which, commenced accidentally, might tend in a great measure to settle the question; but until we see a little more clearly, I do not think it would be prudent to send a great expedition *ad hoc* with the object of penetrating in that direction into the Polar Basin or into the 'Polynia' of the Russians, as it has been the custom to name it.

"This idea, which has been much agitated in France, but of which we have heard less of late, appears to me to be the least practical of all the schemes. You know already how we Russians view this subject. We think that the route between Spitzbergen and Nova Zembla would offer the best chance of success. We stick to it as much as Sherard Osborn does to his route by Smith's Sound. But no matter which line be taken, *provided something be done*. Science will be sure to gain by it, and I see with sincere pleasure that you are beginning to rekindle the question.

"*Apropos* to the term 'Polynia,' there has been a singular misconception in the adoption of it to indicate an open sea round the Pole. Polynia (in Russian) means a hole in the ice more or less large, and rather small than large. It is often employed by Wrangel, because he frequently met with holes in the ice which naturally became more and more numerous as he approached the band of stagnant ice which flanked the coast, and consequently the open sea. But he never intended by Polynia to speak of the sea itself. It has thus happened, that to name one thing, a term has been taken from a foreign language which means quite another thing. Has geographical literature a logic of its own? But custom, like fashion, is a despot with whom we cannot reason; and, after all, what's in a name?"

Admiral OMMANNEY said he concurred generally in the views put forward by Captain Sherard Osborn; but he could not agree with him that all hopes of getting to the Pole by the Spitzbergen route were in vain. He was still in favour of a Spitzbergen expedition, and he was glad to hear that M. Petermann still advocated it. It was a route attended with the least danger of all. As a base of operations they had a harbour in the extreme north, where they might form a safe depôt, and remain on the watch for an opportunity to enter the ice without much risk; and they would always have open-sea communication with the Thames without much difficulty. The failure of Parry's attempt ought not to deter them; Parry had no orders to winter there, and when he left

he much regretted having to come away at that season, because he believed he might have penetrated almost to the pole itself from the small amount of ice that was seen in that direction. It must be borne in mind that Parry quitted the Polar Sea at the most opportune time for advancing with steam-vessels of the present day. The proper way to explore by the Spitzbergen route was to winter there, and choose our opportunity. At the same time, he should be glad to see Captain Osborn's plan put in operation. But he would prefer making Spitzbergen the base of operations, as being more accessible from this country. The advantages of carrying the resources of a ship with you in searching the Polar region, with a view to obtain scientific observations, would infinitely surpass those you could command by sledge journeys. From what he had heard from officers who served with Parry on his Spitzbergen voyage, he believed that from our more recent Arctic experience, and the appliance of steam-power to the improved form of vessels, we could penetrate the icy seas towards the Pole. Therefore he was decidedly in favour of making the attempt with ships from Spitzbergen.

Admiral Sir GEORGE BACK said he gave his opinions upon this subject very fully three years ago, and in what he had to say now he could do little more than repeat himself. He was almost convinced, from having himself been at Spitzbergen, that it would be very difficult, if not impossible, to find a passage between Spitzbergen and Greenland. The ship commanded by Franklin, then Lieutenant, in which he was himself a midshipman, reached as far as $80^{\circ} 36' \text{ N.}$, and was much damaged, her consort being almost broken to pieces; every opening along the edge of the ice was sedulously searched, but they found it impossible to make any progress northward; nor could they approach by any possible means the land of Greenland. On the other hand, he thought the passage between Spitzbergen and Nova Zembla theoretically had many advantages, and ought to be tried. On the whole, he leaned to the route proposed by Captain Sherard Osborn. The passage by Smith's Sound was practicable: an expedition could hold by the land, and when the open water was found they could have recourse to boats and sledges, and could always return. He much feared, however, that the proposal would not be adopted by the Government, with a "southerly wind" in the exchequer; nevertheless, he hoped that polar exploration at some future day might be in the ascendant, and that England would acquit herself as she ought, by accomplishing the very little that remained to be done in the Arctic circle.

Captain RICHARDS (Hydrographer to the Admiralty) quite agreed with Captain Sherard Osborn, that the best way to reach the North Pole was by taking ships as far up Smith's Sound as possible, and performing the remainder of the journey by sledges and boats. It was the only safe and certain route—safe, because in the event of disaster, there would be no difficulty in the crews reaching the Danish settlements in Greenland; certain, in as far as anything could be regarded certain, because greater distances had already been accomplished with similar means. But if it was desired to *explore the Polar basin*, then he should prefer the route by Spitzbergen, which would be more exclusively a ship expedition. One fact of great importance in connection with the proposed exploration, was that in 1882 would occur the transit of Venus over the sun's disc. This phenomenon involved the great question of the measurement between the sun and the earth, which was not at present accurately determined within a million or so of miles. The subject was of the greatest interest to astronomers; the Astronomer Royal, ten years ago, spoke of it as "the noblest problem to be solved in astronomical science." To measure the dimensions of the earth, or its distance from the moon, was an easy task; but to measure the distance of the earth from the sun required all the care and accuracy, all the skill, ingenuity, and knowledge which science could supply, and which man could bring to bear upon it; at the same time it was

an opportunity which occurred very rarely. After 1882 the chance of solving this noble problem would not occur again for 130 years. He could not believe this country would allow such an opportunity to pass, or permit any other country to carry out this great undertaking, without taking a leading part in it. The necessity for making the needful preparations was the strongest argument which could be used in favour of an Arctic expedition at the present time, that is to say, it would enable our officers and men to gain experience in ice-navigation. There were very few Arctic men of the present generation who would be qualified in seven or eight years' time to encounter an Antarctic voyage; but there were two or three still remaining, who were well fitted to educate another generation of naval officers for this service; and in these days, when so much was heard about education, he hoped this branch of it would not be forgotten. The trip to the North Pole by Smith's Sound would be an easy matter; afterwards, he should like to see the Spitzbergen route attempted, with a couple of steamers, fitted out in England, and commanded by such men as went out in the last expedition; and then they would come back ready for this Antarctic cruise. He was not quite so unselfish as Captain Osborn, in consenting that the Germans and the French should commence the work; he thought our twenty years of labour entitled us to take the lead, and he believed we should.

Staff-Commander DAVIS, who accompanied Sir James Ross in the Antarctic expedition, said he did not exactly coincide with Captain Sherard Osborn in wishing to throw over the route between Nova Zembla and Spitzbergen. Captain Osborn's objection to that route rested upon the great masses of ice seen by the Swedish *savans* from Spitzbergen. There was no doubt that the ice in travelling south must impinge upon Spitzbergen, and must be seen in that direction. But when we looked at the vast space of open sea between Spitzbergen and Nova Zembla, where of course there would be masses of ice coming south, he quite agreed with M. Petermann that if two good steamers were boldly to attack the pack in that direction, they would eventually get through a heavy stream of ice coming from the North Pole, and when once through, enter comparatively clear sea until they came to the fixed ice around the Pole, beyond which they could not advance. Taking Captain Osborn's scheme by Smith's Sound as a school for Arctic navigators, he approved of it above everything; it would be a first-rate school. At the same time, he thought Captain Osborn had miscalculated the time and the distance it would take to get from Cape Parry to the North Pole by sledge or boat. In Arctic travel they could not go straight ahead as the crow flies; they must follow the windings of the shore, which must greatly increase the distance, and lessen the chance of getting to the Pole. For the purpose of serving as a school he should like to see the plan attempted, in order to train men for the Antarctic zone; for, speaking from experience, he knew they would have no trifling difficulties to encounter.

Dr. MANN, as an astronomer, spoke in support of the remarks that had fallen from Captain Richards with reference to an expedition to the Antarctic regions to observe the transit of Venus in 1882. It was an opportunity which immediately connected the action of the astronomer with that of the geographer. In dealing with the distance of the sun, the investigator was just crossing the threshold where the easily-handled dimensions of the earth pass into star-distances and star-immensity; where, in short, geography becomes astronomy. The nearer moon was now almost a province of the earth. Such geographers present as were not astronomers might not, perhaps, be aware that the exactness of our knowledge of the distance of the sun—the first step virtually in our astronomical knowledge of the infinite—was in the main dependent on the range we could command in making the investigation. In expanding our possible terrestrial base of observation by a few miles, in so crucial a matter as this of the rarely occurring transit of Venus, we are really securing the chance

of much more precise and reliable value for our prime unit of celestial measures. Hence the importance of geographers co-operating with astronomers in this interesting work. The transit of Venus affords a very remarkable instance of the interdependence of the different sciences. It was important to astronomy that observers should have a larger base for the observation of the transit of Venus: Captain Cook is sent to the Pacific, and geography is benefited by the discovery of the South Sea Islands. Geographers extend the stations of observation by terrestrial discovery, and a more exact knowledge of celestial distances is conferred upon astronomers from the enlargement of their base of action.

Mr. J. CRAWFORD, speaking as a landsman who possessed hardly any knowledge of the subject, said he preferred Osborn to Petermann. Petermann was a landsman like himself: Osborn was a first-rate sailor, and had a vast deal of experience. Allusion had been made to the probability of the proposed exploration receiving no support from the Government. But the transit of Venus was an occurrence which they could not pass over. It was the transit of Venus which led to the great discoveries of Captain James Cook, now about 100 years ago; and he believed similar results would follow on this next occasion.

Captain SHERARD OSBORN, in reply, said he had no opposition to meet except the argument which Commander Davis had put forward, the truth of which he acknowledged to some extent, but he could undertake to remove Captain Davis's doubts over the figures if time admitted. With respect to Captain Richards' remarks, the necessity of training men for the Antarctic cruise some years hence had not escaped his attention. His experience of Arctic exploration had taught him that there was always as good fish in the sea as ever came out of it. He had sufficient faith in his profession to believe that if we were to shut up the Arctic book, within a century it would be opened again: that fresh men would start to the fore, and Arctic exploration would be persevered in by this country till there was nothing further to be known of those regions. At this moment he did not think there was a single Arctic officer fit to go in command of such a party, and do the work he had pointed out up Smith's Sound. The few Arctic officers that remained were not equal to the exposure entailed by sledge travelling. They could command ships a few years longer on Spitzbergen expeditions; but we must have faith in younger men, and trust to them to carry on the work he wished to see undertaken by way of Smith's Sound.

Captain ALLEN YOUNG, who was associated with Sir Leopold McClintock in the search for Franklin, said the question had often been asked, What is the use of Arctic exploration? They had only to point to the west coast of Greenland for an answer, where there were flourishing Danish colonies, which produced 200,000 dollars annually, employed 15 ships, and had churches as far north as 72° N. This was one of the fruits of Arctic exploration. Another was the large fleet of whalers which annually left Dundee and Peterhead, and sailed round Baffin's Bay and the east coast of Greenland. He held in his hand a letter from Captain David Gray (which he read), to show what private enterprise would do. This gentleman had purchased and fitted a new steamer, at an expense of 25,000*l.*, and was going out this month on a scientific, combined with a whaling expedition. He would sail from Peterhead on the 25th of February, and, among other objects, proposed to ascend the east coast of Greenland as far as 80° , and might be the means of ascertaining if the Pole could not be reached in that direction. Captain Young said he agreed with Captain Osborn with regard to making the exploration by land, as far as it was practicable. In conclusion he remarked that the journals of Franklin must be in existence somewhere. No doubt when the ships were abandoned the journals were deposited in a place of safety near the Great Fish River. It only remained to search for them when the snow was off the ground.

The PRESIDENT, in closing the discussion, said the last meeting was honoured with the presence of the Lords of the Admiralty. He only wished that their lordships had been present on this occasion also, to have heard from Captain Sherard Osborn, Captain Richards, and other officers of the navy, the cogent reasons they had given for the employment of British sailors in this most important research. He hoped, upon consideration and reflection, that the day would arrive when a small portion of the British navy would be so employed.

Seventh Meeting, February 24th, 1868.

SIR RODERICK I. MURCHISON, BART., K.C.B., PRESIDENT, in the Chair.

ELECTIONS.—*Capt. Edward Baynton; Nathaniel Cork, Esq.; William R. Dalziel, Esq.; Alfred Gillett, Esq.; David Haysman, Esq.; Henry Kingsley, Esq.; Richard L. Middleton Kitto, Esq.; John William Miers, Esq.; M. Lucas Mavrogordato; James E. Coulthurst Pryce, Esq.; the Hon. Edward Stirling; John William Shaw Willie, Esq.*

ACCESSIONS TO THE LIBRARY SINCE THE LAST MEETING, FEBRUARY 10TH.—Churi: ‘Sea, Nile, and Nigritia,’ 1853. Cortambert and Léon de Rosny: ‘Tableau de Cochinchina,’ Paris, 1862. Barr: ‘Cabul and the Punjab,’ 1844. Vigne: ‘Visit to Ghuz,’ 1840. Martin: ‘Hudson’s Bay Territories, 1849.’ ‘Uhde Lander und unteren Rio Bravo del Norte,’ Heidelberg, 1861. Le Page: ‘Travels round the World.’ Captain Wilson: ‘First Missionary Voyage to South Sea Islands, 1797.’ Presented by E. G. Ravenstein, Esq. ‘Asia: João de Barros e Diogo de Couto,’ &c., Lisboa, 1778. Donor, Captain Constable. ‘Authorship of the Practical Electric Telegraph of Great Britain,’ &c. Edited by the Rev. Thomas Fothergill Cooke, Donor. ‘Lake Victoria: a Narrative of Explorations in Search of the Source of the Nile,’ compiled from the Memoirs of Speke and Grant, by G. C. Swayne. Donors, the Publishers. ‘An Enquiry into the Primeval State of Europe.’ Presented by the President. Gottsche, C. M.: ‘De Mexikauske Levermosses,’ and other papers in the Danish ‘Videnskabernes selskabs Skrifter,’ Copenhagen, 1867. ‘Journal of Travel and Natural History,’ edited by Andrew Murray, Esq. Purchased. Le Comte: ‘Nouveaux Mémoires sur l’Etat present de la Chine,’ 3 vols., Paris, 1697.

ACCESSIONS TO THE MAP-ROOM SINCE THE LAST MEETING, FEBRUARY 10TH.—Three sheets of the Governmental Map of Bavaria, viz.:—Sheet No. 13, Lichtenfels; No. 108, Zweybrücken; No. 109,

Pirmasens. Presented by the Bavarian Government. China: Map of the Province of Kwang-tung, by an Italian Missionary; on 2 sheets. Presented by J. L. Southey, Esq., of Hong-kong. Map of the Arctic and Antarctic Regions. Projected and presented by Dr. A. Petermann. Map of Abyssinia, showing the progress of the British Army. Presented by Dr. A. Petermann.

The following Papers were read :—

1. *Geographical Results of the Abyssinian Expedition.* No. 1.
2. *Geographical Results of the Abyssinian Expedition.* No. 2.

By C. R. MARKHAM, Esq., Secretary R.G.S.

IN these papers Mr. Markham communicated to the Society the Geographical results of the Abyssinian Expedition down to January 22nd, 1868. Commencing with a description of the shores of Annesley Bay, he stated that the ancient Greek city of Adulis, the emporium of Greek trade in the time of the Ptolemies, formerly stood close to the shore; but the ruins were now at a distance of four miles. On a few mounds, concealed by salicornia-bushes, there have been found broken pieces of fluted columns, capitals, and other fragments. But a great wealth of antiquarian treasure may be concealed under the mounds; and Dr. Lumsdaine, after making a very slight excavation, found the bronze balance and chain of a pair of scales,—an appropriate first discovery in the ruins of a great commercial city. The Shohos, who inhabit the plain, are a black race, with rather woolly hair and small-boned; but with regular, and, in some instances, even handsome features. They wear a cotton cloth round the middle, and a cloak of the same material, the head and feet bare, and are always armed with a curved sword, worn on the right side, spear, club, and leathern shield. They have cattle of a very diminutive breed, asses, goats, and sheep. Their mode of sepulture is peculiar; the graves are marked by oblong heaps of stones, with an upright slab at each end. A hole is dug about 6 feet deep, at the bottom of which a small cave is excavated for the reception of the body. The tomb is then closed with stones, and the hole leading to it is filled up. The reconnoitering party, under General Merewether, Colonel Phayre, and Colonel Wilkins, made extensive explorations of the approaches to the Abyssinian highlands in the months of October, November and December. At the head of Annesley Bay an extinct volcano was observed, with a double crater 100 feet deep and 300 feet across; and scoria and pumice were seen scattered over the plain. Beyond Arafali extends a plain, where ostriches and antelopes were met with. Travelling

southwards, the River Ragolay was reached, 49 miles distant from the sea; and the northern limit of the great salt plain, east of the Abyssinian highlands, was traced. It was discovered that the eastern drainage of the whole of the Abyssinian plateau from Senafé to Atsbi, which are 70 miles apart, consisted of tributaries of the Ragolay. At the point reached the river was a perennial running stream, in spite of thirsty sand and scorching sun. Afterwards in flowing towards the sea it descends into a depression 193 feet below the sea-level, which was probably caused by some volcanic action, and its waters are finally dissipated by evaporation. Opportunities would be taken, during the march of the field force along the watershed from Senafé to Atsbi, of completing the examination of the tributaries of the Ragolay to the eastward; and possibly, if any of the ravines through which they flow afford tolerable roads, it may be deemed advisable to open another line of communication by the Ragolay to the sea at Howakil Bay. The author travelled up the Senafé Pass, with Sir Charles Staveley and his staff, between the 20th and 22nd of December. The road enters the pass immediately on leaving Komayli, and winds up the dry bed of the Nebhaguddy. In several places the alluvial deposit brought down by the torrent was from 10 to even 20 feet thick. The pass winds much and is narrow, while the gneiss-mountains rise up perpendicularly on either side. Near Sonakte the gneiss ceases, and a dark schistose metamorphic rock, with strata thrown up at angles of upwards of 70 degrees, takes its place, apparently overlying it. It was observable that, whenever there was running water, the strata were nearly horizontal, or but slightly tilted, while the waterless tracts were those in which the strata were tilted at great angles. Further on the scenery becomes very fine, the cliffs higher, with peaked mountains towering up behind them, and the vegetation richer and more varied. Very fine trees of the fig tribe, peepul, banyan, and sycamore-figs, grow in this part of the gorge, with the feathery tamarix, tamarinds, jujub-trees, and an undergrowth of mimosa, lobelia, and solanum. The author climbed to the top of a hill above Raraguddy, and obtained a splendid view. To the south and west extended the edge of the Abyssinian table-land; running in almost a straight line, with scarped sides of white sandstone. The mountain-ridges or spurs, between which the passes wind, appeared to run off from the table-land at right angles, but afterwards turning to the north and throwing up peaks here and there. Observations for altitude and for latitude were taken at all the principal halting-places. Mr. Markham stated that he had been in the Alps and Pyrenees, had walked or ridden up nearly every pass in the Western Ghauts of

India, from Bombay to Cape Comorin, and knew most of the passes in the Peruvian Andes; and could confidently affirm that in none of these ranges was there any natural opening so easily accessible as that from Komayli to the highlands of Abyssinia. On an examination of the area of drainage of the torrents which flow down these passes, Mr. Markham believed that the danger of floods in the rainy season was not so great as had been supposed. Advantage had since been taken of the delay at Senafé to explore a great part of the neighbourhood, a description of the natural features of which was given in the second paper. The table-land lay at a general altitude of 8000 feet above the sea, and was diversified by valleys, ridges of hills, and peaks; some of which—as Mount Sowayra, ascended by the author—proved to be 9100 feet in height. The geological formation is sandstone, resting unconformably on the same highly-tilted strata as visible in the pass. One of the most interesting points is the character of the vegetation as varying with the elevation; the plants and trees forming successive zones of differing character in ascending from the plains to the mountain-summits. On the summit and slopes of Mount Sowayra (9100 feet) the *flora* is of a thoroughly temperate and even English character. The only tree is the juniper, while the most common plants are lavender, wild thyme, dog-rose, violets, cowslips, and various *compositæ*. The sandstone plateaux have a similar *flora*, but on the lower slopes of the hills bounding the valleys it is enriched by many trees and shrubs of a warmer clime. Italian here mingles with English vegetation. In the lovely gorge of Baraka, on the western side of the Mai Mena Valley, masses of maiden-hair fern droop over the clear pools of water, and the undergrowth consists of a *Myrsine*, a large lobelia, and solanum. At this elevation a vegetation akin to that of the Bombay Ghauts commences. In the Hamas Gorge (5850 feet) there is nothing but acacias and mimosæ. The open valleys, as a rule, are bare of trees. The temperate flora extends over a zone from 9000 to 6000 feet, the sub-tropical from 6000 to 3000, and the dry tropical coast-vegetation from 3000 feet to the sea.

These papers will be printed entire in the Journal, vol. xxxviii.

The PRESIDENT, in expressing the thanks of the Society to Mr. Markham, said the descriptions which he had given of the successive zones of vegetation forcibly reminded him of some of the admirable generalisations of Humboldt. There was scarcely any point connected with the physical geography of the region which had escaped Mr. Markham's attention. He had also communicated some interesting observations on the geological structure of the country. The different altitudes of the table-lands and peaks had been observed and recorded, besides observations for latitude and compass variation. He had sin-

cere pleasure in testifying to Mr. Markham's zealous efforts in former years, in various parts of the world, to work out any problems in geography that engaged his attention. He had twice visited the Peruvian Andes, and had described large portions of that region; in his second journey having accomplished the remarkable work of conveying the cinchona-plant from Peru, and planting it in different parts of India. These services had obtained for Mr. Markham distinction wherever they were known; and he was proud to mention that at the Athenæum Club, where they were in the habit every year of electing nine men eminent in science, letters, and arts, Mr. Markham had the honour of being among the first three that were elected in this season. Seeing the Secretary of State for India present, he might add that, Sir Stafford Northcote had consented to part with Mr. Markham's services at the India Office, where he was most highly esteemed, in order that he might be appointed on his, the President's, recommendation, Geographer to the Abyssinian expedition.

Sir STAFFORD NORTHCOTE, M.P., said, shortly before Mr. Markham was called away he had been promoted to a post of considerable importance and difficulty in the Indian Office, with a view to special services; and he confessed it was not without considerable reluctance that the Council of India assented to his being taken away to engage in another sphere of labour. Mr. Markham had gained a great reputation, considering his years, for the services he had rendered to humanity, more especially with reference to the introduction of the cinchona-plant into India, for which he had received the *grande médaille d'or* at the recent Paris Exhibition. The paper to which they had been listening fully bore out his reputation. It was one consolation, under the melancholy necessity of this expedition, that it gave us the opportunity of promoting the objects of science, incidentally, and he believed that many useful results would be attained. He understood that the season had been an exceptional one in Abyssinia. It had been a season of peculiar drought; and there had, consequently, been great difficulty in obtaining water and forage. The country had also been afflicted with an unusual visitation of locusts, and a great deal of the barley and other crops, upon which the troops reckoned in their advance, had been destroyed. The necessity of having to send a much larger quantity of supplies from the sea-coast to Senafé had delayed the advance of our troops, and would necessarily add to the cost of the expedition. Still this circumstance had not been unattended with advantages; it had enabled us to impress upon some of the native chiefs and their representatives an idea of our skill and power, in being able to turn the sea into drinking-water, and to draw water from the earth by means of Mr. Norton's admirable American pump. The first attempt to penetrate the country was made by the Takoonda Pass, to the westward of Senafé, which is the one best known, but it was found a difficult pass on account of the scarcity of water. The system of ready payment which we adopted had gained the confidence of the natives, and abundant supplies were now pouring in from a considerable distance. The cry of the butter-women and the milk-women was to be heard in the camp; and the inhabitants were most friendly disposed towards us. Their good-will would prove most valuable to us in the advance of the expedition southward.

Dr. BEKE said, with reference to the ruins mentioned by Mr. Markham as having been discovered near Senafé, that Senafé was no doubt the representative of an ancient Greek town, which existed in its neighbourhood, just as Zulla was the representative of the ancient Adulis, although it was some distance on the opposite side of the Haddas. He could not help thinking that Senafé was a corruption of the ancient Greek name. Abyssinia was full of places bearing corrupted Greek names. There was one point connected with physical geography which he might touch upon: it was with regard to the depression of the salt lakes. As long ago as Christmas-day, 1840, when travelling

between Tajurra and Shoa, he examined Lake Assal, and estimated its depression below the sea-level at 760 feet. The salt-plain of northern Abyssinia had now been found to be in like manner below the sea-level. He had always held the opinion that this lake-basin was formerly an arm of the sea, which had been cut off by the land now intervening, and that the water had since evaporated, leaving the salt in a rough solid form. The water-parting of the Abyssinian table-land was very remarkable; for it lay along its eastern edge, not far from the Red Sea; so that near Halai, within view of this sea, the waters diverged, on one side flowing into the Mediterranean, by way of the Nile, and thence running into the Atlantic, and on the other side flowing into the Red Sea, which joins the Indian and Pacific Oceans. When travelling along this water-parting, further south, in company with his friend Dr. Krapf, he remembered throwing sticks into the streams running right and left as they went along, and saying that those sticks would never meet again, unless they went round the Cape of Good Hope or Cape Horn.

Sir SAMUEL BAKER said his personal experience of Abyssinia was confined to the north-western slopes of its table-lands, where he had spent many months, and had penetrated, in the course of his hunting excursions, into the ravines which occur every few miles in the chain of mountains. The description that had been given by Mr. Markham was most interesting to him. It was clear that in advancing southwards from Senafé our troops would have to cross every one of the tributaries of the Nile running from the watershed of Abyssinia. Up to the present time Mr. Markham had had but a short acquaintance with the country; but he would find, as he gained more experience, that our troops are in one of the finest countries in the world. He had himself discovered that the whole of the northern and western sides of this country, which had only been passed through in a direct line by Mr. Mansfield Parkyns, and by Bruce 90 years ago, might be made one of the finest cotton producing countries in the world. He found that, although far distant from the port of Suakim, which was the natural outlet (not Massowah), that the price of transport by camels was simply four shillings per cwt., or a little less than one halfpenny per pound. Therefore, although people in England might imagine the distance from our market would be too great for cotton to be grown profitably, he could assure them that if there were only a stable government established, the region in question would be one of the greatest cotton-growing countries in the world. Coming to Abyssinia proper, he had noticed the same geological structure in the north-west which Mr. Markham found at Senafé. It consisted of sandstone lying upon schistous rock, but as he approached the mountains he found that basalt had forced its way apparently through the sandstone, and formed the elevated peaks of the great chain of mountains rising abruptly to a height of from 8000 to 12,000 feet. The face of the mountain range on the northern side formed a nearly perpendicular wall. The reason of this was obvious. After the heavy rainfalls, a tremendous rush of water poured down upon that side, which had entirely altered the form of that portion of the country. Instead of being a gradual ascent and descent, as it was on the other side, between Senafé and the sea-coast, it was found to be perfectly precipitous; the great floods had carried away the whole of the earth, and that earth now formed the delta of the Nile at Alexandria. With regard to the captives, the question now was, should we be able to reach Magdala before the rainy season set in? Up to the present time, taking into consideration the enormous difficulties of the country, there could not have been fewer mistakes made. But he felt perfectly convinced that it would be impossible for our army to reach Magdala and to finish the war before the rains. Few people could appreciate what these rains meant until they had seen an Abyssinian rainy season. When those rains began there was a total cessation of travelling; and with the young grass, unfortunately, a fatal cattle epidemic appeared. These were things which no general could combat against. If the captives should still be at Magdala whilst we

were at Adigraht, the difficulty would be this, that when the King found himself hemmed in by the advancing forces of Sir Robert Napier, he would most likely kill the captives, or retreat with them into the mountains, and hold them as hostages, so as to force Sir Robert Napier to agree to his own terms; or should Sir Robert Napier refuse to sign such an agreement, then the war would be carried on *ad infinitum*. Or supposing we caught Theodore, and obtained the release of the captives, the question would be, "What shall we do with Abyssinia?" It was proved to be a most healthy country, it was a cotton and coffee-growing country, it had good ports on the Red Sea, and it was on the high road to India. Most people dreaded annexations; but he had a firm conviction, that after having spent 10,000,000*l.*, and having conquered Abyssinia, if we should retire from that country, the natives of India would say that we had been driven out: we should, therefore, lose our reputation, to preserve which had been the object of the war. He had, therefore, come to the conclusion that the English ought to remain where they were, and retain possession of the country.

The PRESIDENT remarked that Sir Samuel Baker, who in the earlier part of his observations had very effectively expatiated on the geographical features of North-western Abyssinia, had ultimately drifted into political questions which were well suited to the House of Commons, but wholly out of the province of this Society. He must recall his attention to matters of geography. He (the President) held in his hand a new map of Eastern Abyssinia, which he had received that morning from Dr. Petermann, of Gotha, and which contained all the geographical information obtained up to the present time by our expedition. It was a remarkable instance of rapid execution in cartography, the official map containing the new information having only been issued by the Topographical Department of our War Office a fortnight previously. Our own authorities and the public were much indebted to Colonel Cooke, of the Topographical Department, for the ability and promptitude with which he incorporated the new information into the official map of Abyssinia. He also held in his hand a series of most graphic sketches representing the features of the interior of Abyssinia, made by Mr. Essler, one of the captives who escaped. They now belonged to Bishop Gobat, and were about to be lithographed and published by Mr. Hotten of Piccadilly. He then called on Colonel Cooke to speak, and expressed a hope that, whoever might address the meeting, the speaker would confine himself to scientific matter.

Sir HENRY RAWLINSON said he was sorry Colonel Cooke was not present to give some of the results of his well-digested researches into Abyssinian geography. The Blue Book compiled by him was one of the most admirable digests that was ever put together. It must be invaluable to the officers engaged in the expedition. In alluding to this work he wished to draw attention not merely to the geography of the country which our troops had passed over, but also to the geography of the country through which they would advance. Before the British troops had landed on the coast they were able, owing to the information that Colonel Cooke had collected, to indicate the route the army would have to march along, at least so far as to point out, as he had the honour of doing in that room three months ago, that Senafé would probably be the first post, Adigraht the next, and Antalo the third. With regard to the geography of the country further southward, they were able with the help of this book to anticipate day by day pretty nearly what would happen to our troops almost the whole way to Magdala. He disagreed with Sir Samuel Baker as to some of the difficulties which he foreshadowed. In the first place, the troops would not cross any of the streams; they would keep along the eastern edge of the table-lands, so as really to go round the head-waters of the streams, and consequently avoid the precipitous ravines which furrowed the country. It was the route which Dr. Krapf followed on his journey. Dr. Beke travelled from Antalo to Sokoto, and had to cross the river valleys, and in so doing got into

more difficult country than he would have done if he had kept along the crest of the mountains. The most important point was, that the country between Adigraht and Antalo, which was the district about to be traversed by our troops, was really the easiest country in all Abyssinia. It consisted of a high plateau, and was so open that Lefebvre and Krapf both mention that it was sometimes traversed by camels. It was important to know that we need not expect the same difficulties and the same delays that had occurred hitherto. The real difficulty and the real cause of delay was the ascent to the plateau from Annesley Bay. Once there, it was plain sailing all the way to Antalo. Nor was there any occasion for misgiving with regard to the rainy season. According to the accounts of all travellers, the rainy season need not stop operations in any way. The great Portuguese expedition took place during the rainy season, and the great battle which they fought with the Abyssinians was on the 15th of August, in the very midst of the rainy season. The prisoners had always stated that although there was rain for three or four months in the year, no unhealthiness accompanied the rain. But for the exception of getting a wet skin occasionally, there was no more inconvenience in marching in the rainy season than at any other time of the year. He should not follow Sir Samuel Baker into a discussion of the political part of the subject; but with regard to his "inevitable suggestion," he thought, looking at the point fairly and dispassionately, that there were stronger grounds against than in favour of annexation. We had given a pledge to the whole world that we did not contemplate territorial acquisition, and we were bound in honour and fairness to carry this out. At the same time he saw no valid objection to our retaining a footing on the coast, which did not belong to Abyssinia, not merely for purposes of commerce, but also of philanthropy, in view of the more effectual suppression of the slave-trade.

SIR STAFFORD NORTHCOTE said, after the two last speeches if he were to remain silent it might be supposed that he assented to the views they expressed. But he must be permitted to say that they did not represent the views of the Government. We had undertaken this expedition for one purpose, which was to rescue our fellow-men and our envoy from captivity; and when we had succeeded in that object our forces would be withdrawn, and no other consequences would follow.

DR. BEKE wished to add, with respect to the rainy season, there was not a day during which there would not be several hours suitable for an army to march. Sir Henry Rawlinson had spoken quite truly in saying that the Portuguese campaign was carried on and their great battle fought during the rainy season; namely, on August 30th, 1542. In the year 1805, Mr. Salt left Arkiko, on the coast of the Red Sea, on July 18th, and arrived at Antalo, the Ras's residence, on August 18th. Thence he went to Adowa and Axum, returning to Antalo in time to be present, on September 26th, at a grand muster and review of the Ras's troops, who "had for several days past been assembling from all parts of that Prince's dominions;" and on October 10th he left Antalo on his return to the coast, which he reached in perfect health on November 7th. He believed the British army could march along the upper country every day of the year without exception.

MR. CRAWFORD said he did not think the rainy season so dangerous and difficult as Sir Samuel Baker had represented. Moreover, the rainy season did not commence till June, consequently there were four months for the troops to march to Magdala, and they had already advanced one-fourth of the way. He was opposed to keeping possession of Abyssinia, and he could not agree with Sir Samuel Baker in thinking it could ever be made a cotton-producing country. The inhabitants of Abyssinia were barbarians, and no barbarians ever did produce cotton.

Eighth Meeting, 9th March, 1868.

SIR RODERICK I. MURCHISON, BART., K.C.B., PRESIDENT, in
the Chair.

PRESENTATIONS.—*J. W. Miers, Esq.; George Bentley, Esq.; F. M. Metcalfe, Esq.*

ELECTIONS.—*C. Anstey, Esq.; G. Bentley, Esq.; W. Bull, Esq.; W. H. Cole, Esq.; Frederick Dutton, Esq.; R. G. E. Dalrymple, Esq.; Major Goldsworthy; Hugh Jamieson, Esq.; the Right Hon. the Earl of Kellie; W. H. Lane, Esq., B.A.; Major G. D. Pritchard, R.E.; W. B. Watson, Esq.; W. C. Wentworth, Esq.*

ACCESSIONS TO THE LIBRARY FROM FEBRUARY 24TH TO MARCH 9TH.—‘Grammar of the Coorg Language.’ Bangalore, 1867. By Capt. R. A. Cole. Donor, the Author. ‘Die Länder am untern Rio Bravo del Norte, von Uhde.’ Heidelberg, 1861. ‘Die Preussische Expedition nach Ost-Asien.’ Purchased. ‘Die ersten Aufnahmen der Englischen in Abessinien, Nov., 1867, bis Jan., 1868.’ With two Maps. Donor, M. Aug. Petermann. ‘Notice Historique sur le Monument erigé par la Ville de Paris aux Sources de la Seine, par M. Larribe.’ Paris, 1868. Donor, the President. ‘Report on the Vegetation of the Andaman Islands, by S. Kurz.’ Donor, Mr. Thomas Anderson. ‘Scenery and Studies of Savage Life.’ By Gilbert M. Sproat. Donor, the Author. ‘History and Migration of Cultivated Narcotic Plants in Reference to Ethnology.’ By J. Crawford, Esq. Donor, the Author.

ACCESSIONS TO THE MAP-ROOM TO MARCH 9TH.—Map of the Kirghiz Steppe and the countries conterminous with the Central Asiatic Possessions in Russia. Presented by the War Office. A View of Magdala, from a sketch by Th. von Heuglin. Presented by the Topographical Office.

The PRESIDENT, before proceeding to the business of the evening, said, in consequence of repeated complaints from Fellows of the Society, of the difficulty of finding seats at the evening meetings, the Council had appointed a Committee to inquire into the subject; and as the result of their deliberations the following Resolution had been passed :—

RESOLVED :—“That the whole of the centre block of seats at Burlington House be exclusively reserved for members of the Society, and the first row of that block reserved for the Council, the two wings to be devoted to ladies and strangers, with the reservation of the two front rows of the wings for distinguished visitors, and ladies introduced by members of the Council. The rule that a member shall only introduce one lady or one friend to be strictly enforced. After the President has taken the Chair no seats whatever to be reserved.”

The following Paper was read :—

On the Geography and Mountain Passes of British Columbia, in connection with an Overland Route. By ALFRED WADDINGTON, Esq.

THE author commenced by stating that the possibility of opening a direct and available line of communication between Canada and the Pacific Ocean, through British North America, had been for many years a subject of doubt. This was chiefly owing to our imperfect acquaintance with the geographical features of the country west of the Rocky Mountains. He had himself spent more than five years in various efforts to explore British Columbia with this view, and had equipped and sent out numerous exploring parties in all directions; the result was the discovery of a practicable route for a railroad through the Cascade Range and the survey and partial opening of 222 miles of road through a previously unknown country, between the coast and the mouth of the Quesnelle River, which must necessarily form the first link in any future overland route. British Columbia was to a great extent occupied by two ranges of mountains running N.N.W., but gradually diverging from each other as they advance towards the north, where they enclose a vast central plain. The main crest of the eastern range, or the Rocky Mountains, forms the eastern boundary of the colony, and comprises several peaks rising to the height of 16,000 feet; but these mountains in British Columbia are composed of three distinct chains, divided from each other by rivers and deep valleys. The middle range presents one uninterrupted line of mountains (some of them 12,000 feet high) for a distance of 240 miles. The travellers who have discovered the principal passes in the Rocky Mountains had been unable to push their explorations beyond the eastern or upper portion of the Columbia River, so that neither the middle range nor the western one had been hitherto examined. These were, however, carefully explored in 1867, and it was proved that no practicable pass existed through the middle chain. The western range rises from 4000 to 8000 feet in height, and south of Fort Shepherd it is composed of no less than eleven sharp and nearly parallel ridges. The only good pass from the Columbia River, through this third range, is in 50° 56' N. lat., near the southern end of Souswap Lake, and was discovered in 1867 by Mr. Moberly, the Government Engineer at Eagle Creek. There is, however, this important feature in the middle and western ranges, namely, they both become gradually lower north of Cariboo, and this depression forms a large tract of level country on the south side of the Upper Fraser, most suitable for the passage of a railroad through this difficult country. The average width of the Cascade or Coast Range is about 110 miles; it

forms a sea of mountains, some of which reach an altitude of 10,000 feet. Near the boundary line this range throws out a spur east and north, so as nearly to connect it with the Rocky Mountains. It is over the formidable Alpine masses here grouped together that the present wagon-road lies towards Cariboo; and it has been pronounced by competent authorities that there is no reasonable way of getting over it with a railroad. After examining the various deep fiords along the coast north of Fraser River, the author had finally given the preference to Bute Inlet, as being by far the best starting-point for an overland route to Canada from the Pacific. Its advantages were: a better harbour, a passage through the Cascade Range by the river valley at its head, and its proximity to the best part of the great central plain before mentioned, across which the proposed road would pass to the Upper Fraser and the Leather Head Pass of the Rocky Mountains. The author had well explored the head of the inlet, and had surveyed the road through to the plain. The trail cuts through the Cascade Mountains by a deep valley, and rises imperceptibly for 84 miles to its maximum height of 2500 feet, and the communication is open throughout the winter. The valley of the Homathco River at the head of the inlet is 80 miles in length, and varies in width from three miles to less than a quarter of a mile. It is in general heavily timbered, but contains rich bottoms capable of producing any kind of crops. The central plain, at the point where it is crossed by the proposed road, is 120 miles wide, and has vast pasturages and park-like scenery. The Leather or Yellow Head Pass is preferable to any other through the Rocky Mountains, not only on account of its low altitude (3760 feet), but from its easy gradients and the superiority of its approaches both from the eastward and the westward. The author concluded with a few remarks on the urgency of a direct overland communication between Canada and the Pacific, through British territory. In a political point of view, and as a natural consequence of the late confederation, it would contribute essentially to its prosperity. At present England has no other communication with the Pacific but by New York and San Francisco; and the Red River Settlement remains isolated, midway between our Atlantic and Pacific Colonies.

The paper will be printed *in extenso* in the Journal, vol. xxxviii.

MR. WADDINGTON made the following remarks in addition to his paper. He said that Mount Baker was an active volcano, and that Mr. Coleman, of Victoria, formerly a member of the Alpine Club, had twice attempted the ascent in company with Mr. R. Brown; once they were stopped by an Indian chief, and the second time, making the attempt by the northern side, they were arrested near the summit by immense cliffs of snow and ice. The eruptions of this mountain consisted of vapour and smoke, but no lava had yet

been seen to come from it. About two years ago an eruption took place, simultaneously with the earthquake at San Francisco, and on that occasion one of two peaks which formed the summit partially fell in. With regard to the overland route which he proposed, he believed he had shown the practicability of opening such a communication between the eastern and western sides of the North American continent, in British territory. The distance from Montreal to the head of Bute Inlet was 3490 miles, while the distance between New York and San Francisco was 3300 miles. Out of these 3490 miles, 2400 would consist, according to his plan, of steam-boat navigation along the rivers and lakes. At the commencement there would be 442 miles of railroad from Montreal to Collingwood, the head of the Canadian railroad system on Georgian Bay, which connects with Lake Huron and Lake Superior, and on the other parts of the line there would be 648 miles of dray-road; of which, with the assistance of gentlemen in this country, he had engaged to make 222, that is, the section between the head of Bute Inlet and the mouth of the Quesnelle, a tributary of the Fraser River. The Canadian Government had engaged to make the road between Lake Superior and Fort Garry, the head of the Red River Settlement, excepting the 91½ miles between the Lake of the Woods and the Red River, which the authorities of the settlement had pledged themselves to open. Consequently there remained only 140 miles east of the Rocky Mountains, between Edmonton and the Yellow Head Pass to be provided for. The road would therefore consist of the following sections. Starting from Lake Superior, the first piece of road, 28 miles in length, to Dog Lake, was already begun by the Canadian Government. Then came 35 miles of navigation through Dog Lake and along a portion of Dog River. To this succeeded a portage of 5 miles; then 65 miles of navigation again, with another break of 66½ miles; then 208 miles of navigation along the Rainy River and through the Lake of the Woods to the end of Shoal Lake; after this there were 91½ miles of plain road from Shoal Lake to Fort Garry. From Fort Garry the route took a northerly direction down the Red River into Lake Winnipeg; up Lake Winnipeg; then along the Saskatchewan the whole way to near the foot of the Rocky Mountains for a distance of 1249 miles in one stretch, with the single break of the rapid, called the *Grande Rapide*, at the mouth of the Saskatchewan and Lake Winnipeg. Those 1249 miles could be made, at very slight expense, easily navigable by steam-boats. Touching the navigation of the Upper Saskatchewan in the autumn, when the waters are low, the general opinion—in which Sir James Douglas, former Governor of British Columbia, concurred—was that light steamers could run during the whole season, except when stopped by frost. With regard to the 140 miles between the Saskatchewan and the Rocky Mountains, it was a question whether this section should be opened by the Canadian Government or the Hudson's Bay Company; the Crown having declined to have anything to do with it. Then came the Upper Fraser, which formed a circuit round the Cariboo Mountains of 280 miles. The Upper Fraser was perfectly navigable for steamers; it was as quiet as the lower part was impetuous and rapid. From the mouth of the Quesnelle, where these 280 miles terminated, he proposed a line of railroad, 222 miles in length, which would take the route to Bute Inlet, where there was a good harbour and the easiest communication with Victoria. He had been down twice in a steamer in sixteen hours from Bute Inlet to Victoria. The entire communication could be opened at very small expense, and in a very short time. The Hudson's Bay Company had almost promised that they would put steamers on the Upper Fraser, if the scheme were carried out in British Columbia. On the Saskatchewan the question was still to be settled, because for the first two or three years the steamers would have to run for nothing; and some plan must be found of subsidizing them, either by grants of land or money. He had forgotten to mention that the distance from Collingwood to the north-west end of Lake Superior was 534 miles. With reference to the questioned advantage of

opening this country, Mr. Waddington stated that the region traversed by the Saskatchewan, for a distance of 1250 miles, was remarkable for its fertility and good climate. He also pointed out the political and commercial importance of forming a connection between Canada and British Columbia, and of opening a road to the Red River Settlement, which was at present isolated from the rest of the world. The traders at Red River Settlement were obliged to go to St. Paul for all the goods they required, a distance of 580 miles, at a charge of 120 dollars per ton. Moreover, American squatters were pushing their way into Red River Settlement with the view to divide British Columbia from Canada. Mr. Waddington finally called attention to the rapid progress being made by the Americans with their Central Pacific railroad connecting New York with San Francisco, which would be finished in 1870, and strongly urged that this country ought not to allow itself to be outstripped in the race.

The PRESIDENT remarked that the portion of the paper which more particularly concerned them as geographers, was that which described the previously unexplored districts of British Columbia. Mr. Waddington had shown that the Yellow Head Pass—the pass which Lord Milton and Dr. Cheadle had chosen—was the very best pass for transit between the east and west. But instead of passing down to the mouth of the Fraser River, as Lord Milton and Dr. Cheadle proposed, he had pointed out an entirely new route by the head of Bute Inlet, which conducted into a level country which was easily traversible by railroad. His description of the Bute Inlet road and the Rocky Mountains was entitled to the highest commendation as an important addition to our geographical knowledge.

Captain G. H. RICHARDS said he had spent nearly seven years surveying the sea-coasts of British Columbia and Vancouver Island, and he could conscientiously support the views of Mr. Waddington. The question of a route connecting Canada with the colonies on the Pacific coast was of vital importance no less to this country than the colonies. So soon as that route is accomplished, federation between Canada and British Columbia would be effected, and the retention of British Columbia would be secured. At present British Columbia and Vancouver Island were cut off from this country by 16,000 miles of sea, and were entirely dependent on the British Navy for their protection. So soon as there was a route opened throughout our own territory, all this would be changed. Of the three routes which had been alluded to, the North Bentinck Arm route was too far north; and the Fraser River, though it had many advantages which Mr. Waddington had in his opinion under-estimated, being more available for navigation than he allowed, would not, however, become the western terminus of the route, owing to the obstacles intervening between its lower course and the head of the navigation. The Fraser River was a magnificent stream in its lower part, and it was available for navigation and commerce in suitable vessels; but in the upper waters existed the rapids and mountain ranges which Mr. Waddington had spoken of. If there were not these difficulties he should be in favour of the Fraser River, simply because it was further south, consequently in a less rigorous climate, and it was also the natural opening into the country. Bute Inlet was more likely to be the western terminus of an overland route than any other on the coast. He congratulated Mr. Waddington on his able paper, and on the great perseverance, energy, and industry which he had shown in the exploration of this route; and he hoped he would be rewarded by seeing his schemes carried out.

Dr. RAE said he found the latitudes and altitudes given by Mr. Waddington agreed almost exactly with his own. He had been down the bend of the Fraser River in small canoes with the view of examining telegraph-routes. He saw several places that could not be made navigable for steamers; and there was one rapid that ran at the rate of about 15 miles an hour, full of rocks and stones, five miles long, above Fort George. Some of the ablest men from the Red River were in his party, and they said they never passed

worse rapids in their lives. Above the Quesnelle the rapids were so bad that nearly every year men were lost in them, and it was only the expertness of his own men that saved his party from being lost once or twice. In another part of his route, he might add, that two years ago a gentleman was sent to examine the Saskatchewan for the purpose of ascertaining whether it was practicable for steam-navigation, and his report was unfavourable. It is true the year he was there might have been an exceptional one. He believed these rivers, though probably practicable at one time for steam-navigation, had become, from the wearing away of the banks and the widening of the stream, much shallower, and consequently less available for steamers. The late Governor of the Hudson's Bay territory, Mr. Dallas, was the first to point this out to him with regard to the Red River, on which a steamer was placed some years ago, but it had scarcely ever made more than one trip every season since, in consequence of the shallowness of water. At Fort Garry, within the memory of man, the river was so narrow that a person could throw a stone across; it was now several hundred yards wide, and the depth of water was thereby diminished.

Mr. DALLAS, late Governor of Prince Rupert's Land, had great pleasure in bearing testimony not only to the accuracy of Mr. Waddington's description, but to the time, labour, and money he had bestowed upon these explorations. He was entitled to the merit of being the first to explore the territory from the head of Ponte Inlet, through which he had drawn his proposed railway. With regard to the navigation of the Saskatchewan, he could confirm what had been said by Dr. Rae. All these rivers were gradually getting wider, their beds were rising, and, in consequence, their waters were every year assuming different channels. The Saskatchewan partook of the character of a mountain stream; during one portion of the year there was a very large body of water, at another portion it was very shallow, and much obstructed by sand-bars. Therefore, they must not rely too much upon water-communication as a through-line of route across the continent. To compete with the Americans we shall have to depend upon a railway. He had gone over the whole line of the Saskatchewan, both by land and water, and he thought a railroad could be made with the greatest facility, including that part of the region where water-communication could no longer be relied upon.

Dr. CHEADLE, the companion of Lord Milton in an exploration across the Rocky Mountains, said he agreed generally with Mr. Waddington's views. There were one or two points, however, in which he differed from him. One was as to the navigability of the Upper Fraser, in which, as Dr. Rae stated, there were so many rapids that it would hardly be available for steamers. The country from the Red River Settlement to within 200 miles of the Rocky Mountains was so level that a railroad could be made without any difficulty. The only question was, having crossed the Rocky Mountains by the Yellow Head Pass, how were we to get from that point to the level plain on the west? Supposing it were impossible to take a steamer along the Fraser from the western extremity of the Yellow Head Pass to the mouth of the Quesnelle River, he apprehended it was quite practicable to follow the route taken by Lord Milton and himself, down the north branch of the Thompson River, and so descend upon the southernmost portion of this great central plain. It was of very great importance that this route should be opened as soon as possible, in order to connect British Columbia with Canada. A Commissioner sent by the State of Minnesota to examine the land in the region of the Saskatchewan, reported that it was of the highest value—"a country worth fighting for." Already American squatters were flocking into the territory, and were telling us that "the boundary line was 50 miles too far to the south."

Mr. FREDERICK WHYMPER said he had been over a large portion of Mr. Waddington's route, and he must pay a compliment to his engineering skill. He had scarcely, however, mentioned the magnificent glaciers which were so

grand a feature in the country, particularly those at the head of Bute Inlet. The largest glacier was ten miles long and three-quarters of a mile across. The terminal *moraines* were very strongly marked. He (Mr. Whymper) had a very vivid recollection of that visit, having narrowly escaped the fate that befel the larger part of the road party, who were murdered by the Indians but two days after he had left them. His guide, an old Chilicoten chief, was subsequently hung for his share in that terrible massacre.

Mr. WADDINGTON, in reply to the statement of Dr. Rae with regard to the Saskatchewan, said he held in his hand a printed report from Mr. Alfred Perry, a well-known and reliable traveller. It was dated June 6th, 1861, and was to the effect that the Saskatchewan was available for steam-navigation. It stated, moreover, that from the "Rapide des Fourneaux," eight miles below the Yellow Head Cache down to the mouth of the Quesnelle, the Upper Fraser was navigable for steamboats; that the river was not less than six feet deep in the shallowest parts, and the current slow, more like a lake than a river. He had also the opinion of Sir James Douglas with regard to the Upper Fraser. There were four rapids. The worst was the *Grande Rapide*, above the mouth of the Quesnelle; and Sir James Douglas said he was convinced it was not so bad a rapid as the Emory Rapid below Fort Yale, which had been considered impracticable for several years, but was now steamed over daily. If necessary, he could take his railroad 19 miles higher up the plain, and thus avoid this rapid.

Dr. RAE said that, at the time of year he was there, the water in the river was so low that no steamer could navigate it.

Mr. WADDINGTON added, he had talked the matter over more than once with Mr. Brewster, his deceased foreman, who had been over the route, and that gentleman assured him that a steamer could get through at any time.

The PRESIDENT wished to make one observation in conclusion, and that was to repeat what he had said at the commencement of the discussion, namely, that the essential part of the paper was the geographical portion, describing the new route Mr. Waddington had explored from the Bute Inlet, with a view to a railroad connection between our colonies on the Pacific and Canada. If that railroad were ever made, to Mr. Waddington would belong the credit of having pointed out the most practicable and easy line for the purpose.

ADDITIONAL NOTICES.

(Printed by order of Council.)

1. *Additional Notes on the Geography of Southern Peru.* By WILLIAM BOLLAERT, Esq., F.R.G.S., &c.

IN Volume XXI. of the 'Journal of the Royal Geographical Society' will be found my first paper "On Southern Peru, with Survey of the Province of Tarapacá," by my friend Mr. George Smith, F.R.G.S., and myself, in 1827, but brought down to the date of publication, viz., 1851.

Since then, I have again visited Peru, and explored more particularly the southern portion, which has become an interesting commercial locality, in consequence of the working of the vast deposits of nitrate of soda, and the discovery of the valuable borate of soda and lime; and I have brought the additions to the Map of the Province of Tarapacá up to 1866.

The nitrate of soda is a well-known fertiliser, extensively used in the arts,

also in the manufacture of gunpowder. In 1820 samples of refined nitrate were sent to Europe; in 1830 a few tons. Its export then went on increasing, when last year it amounted to 125,000 tons. The nitrate contains a large quantity of iodine, and experiments are in progress for economically separating this valuable substance. Bromine also exists in the nitrate.

The Peruvian province of Tarapacá, in the department of Moquegua, is bounded on the north by that of Arica, on the east and south by the Republic of Bolivia, and on the west by the Pacific Ocean; a rainless desert region.

The Quebrada, or ravine of Camarones, in the north, in $19^{\circ} 12' 30''$ s., is generally considered the boundary with Arica; but the people of Tarapacá say their boundary is a few miles further north. In the south the River Loa, in $21^{\circ} 28'$ s., is the boundary with Bolivia; and in a MS. Report,* in my possession, of 1628, the first boundary pile of stones is placed at the mouth of the River Loa.† When on the survey of the province in 1827, our guides told us that the mountain of Cancoso, about $68^{\circ} 15'$ w., was on the eastern boundary.

The population of the province is from 19,000 to 20,000, composed of Peruvians, some Chilenos, foreigners, and Indians of the Aymará family, the latter wholly employed in taking provisions on mules and asses from the interior to the Oficinas or Nitrate Works, then conveying the refined nitrate to the coast for shipment, returning with Chile (and even English coal) and provisions to the Nitrate Works, of which there are about 100, giving employment to nearly the whole population.

The principal points of embarkation of the nitrate are Iquique, Mejillones, Pisagua, Junin, Molle, Chucamata, and Patillos. Huano is taken from Huanillos, Pabellon, P. de Lobos, and Puerto Ingles.

There are three ravines that cut through the province from east to west, or from the Cordilleras to the sea, having long desert tracks between them. Are these entirely water-worn ravines, or have they been partially formed by earthquake fissures? In some of these, particularly in that of Pisagua, there are very deep, narrow, and perpendicular clefts, known as *Mal Pasos*, not to be traversed. That of Camarones in the north, into which run the smaller ones of Chisa and Liga. That of Pisagua, with brackish water, I have traced up to the dividing ridge or pass of Pichuta, 14,300 feet above sea-level; the generally dry ravine of Tiliviche enters that of Pisagua at the western edge of the extensive table-land or Pampa de Tamarugal. That of the Loa has a saline river.

There is a second set of ravines also rising in the Cordilleras, their waters generally saline, which flow into the Pampa de Tamarugal.

Also a third, including numberless dry ravines; however, when heavy rains occur in the Cordilleras, a small portion of water would be conducted by these into the Pampa.

The region in which these ravines rise is composed of huge mountain-chains, sometimes called the Cordillera of the Coast, some of the peaks over 22,000 feet, and one—the Lirima—is probably over 23,000 feet above sea-level; with apachetas—piles of stone in passes—abras, or passes, from 13,000 to over 15,000 feet; one, that of Pusupucâne near the Lirima Peak, I am informed by Mr. Williamson, is 16,146 feet.

Within the Cordilleras are hollows and plains, at 12,000 to 14,000 feet, their central parts being either marshes or lakes, some of the latter containing three or four sorts of small fish. These lakes do not appear to have outlets, their waters being kept on a level by percolation and evaporation.

* Contained in 'Memoria de la S. Iglesia de Arequipa par El Arcediano F. J. de Acheveria,' 1810.

† In Ondarza's Map of Bolivia the boundary comes down to Chuicchuic on the Loa; I only take it up to Quilliagua.

Having surmounted these passes, say in the north, the descent is to the great Andean table-land, and about east from the volcano of Isluga is the south end of the great Lake Aullagas.* To the south and east of the copper-mines of Yabricoya,† and having surmounted the passes in the Cordilleras of Silillica, and as high as 15,422 feet, there are salt plains and salt lakes, one 60 miles across, to the east of which are other great mountain-chains, sometimes called the Andes, with the Illimani, 24,155 feet, and the Illampu, 24,812 feet. Above Huatacondo, in the province of Tarapacá, are many high passes, that of Remedios 14,450 feet.

The city of Iquique was declared to be the capital of the province in 1866. Fitzroy in 1833 gave for the latitude $20^{\circ} 12' 30''$ s., $70^{\circ} 13' 30''$ w. (the old church). Gillis and Möesta's more recent observations for the longitude of Valparaiso would go to show that the whole coast of the Pacific is about 4' too far to the west, as placed on Fitzroy's admirable chart. Now if 4' be subtracted from Fitzroy's longitude of Iquique, we shall have the corrected longitude of $70^{\circ} 9' 30''$.‡

Iquique with this new branch of industry, the nitrate of soda trade, from the smallest of fishing-villages, has now a resident population of over 5000. The streets are lined with well-built houses; there are several moles, a lighthouse, two churches, hospital, theatre, club, newspaper, and the place is lit with gas; indeed, all the comforts of life are had at this barren spot where there is neither vegetation nor water; the last most necessary article is distilled from that of the ocean. Some of the silver ores of Huantajaya are amalgamated here with seawater.

Another great sign of progress is the construction of a railway from Iquique to La Noria, 33 miles in length, a great centre of the nitrate refiners, which, when finished, will diminish the wear and tear of 15,000 horses, mules, and asses, employed in taking fuel, provisions, &c., to the interior, and bringing down refined nitrate.

Some observations on this line surveyed by Mr. Pickering, as well as another projected across the Cordillera into Bolivia, by Herr Reck, will give an idea of the great elevation of the country above the level of the sea.

The Iquique and Noria line commences at the former place to the base of the coast-range, then by a long and sandy ascent of 10 miles, near to the upper part of Molle, 1761 feet. The line then curves round the mountain of Santa Rosa to the Noria, 3277 feet. Now begins the line into Bolivia by the town of Tirana, in the Pampa of Tamarugal, 3332 feet; Pica, at the base of the Cordillera, 4483 feet; then over the north end of the Serrania of Huatacondo, by a pass 12,942 feet; along the Pampa of Chacarilla, 12,660 feet, by the north end of the Cordillera of Silillica, thence to Garita, 12,296 feet. There are peaks 5000 feet above the more elevated passes; one of the latter in this direction, east of the Pampa of Huasco, is 15,422 feet. The descent is now to the great table-land, where in the east and north-east is the Cordillera Real, containing, among other giants of the Andes, Illimani and Illampu. Skirting the north side of the Pampa of Impejsa to Sicsigua, 12,431, to Canquella, 12,155,

* Dalence, 'Geografia de Bolivia,' p. 30, calls this the mysterious Lake of Pampa Aullagas (or Poopo-Choro), with many inlets, but no outlets, and always at same level. It is thought there is an underground communication on the coast of Tarapacá, and it was reported at the commencement of the last century that fragments of floats of rushes as used on the lake were found on the coast near Iquique. I may observe that, considering the great elevation of the lake, 12,136 feet, with the powerful evaporation that takes place, caused by the rarefied state of the atmosphere, and percolation, is sufficient to keep the lake on a general level.

† See 'Mapa de Bolivia 1869, proyecto del Ferro-carril á la Costa par Hugo Reck.' Wyld, London. Private distribution, with a pamphlet.

‡ 'Geogr. Soc. Journal,' 1858; 'S. American Pilot,' King and Fitzroy, 5th edit., Part II. p. 437.

Isuaya, 12,165, through the salt lake and marsh of Coipasa, 12,136, to the River Laga-ahuira, through the Lake of Pampa Aullagas, 12,136, the River Desaguadero to Lake Titicaca, 12,601, whence the Peruvian frontier city of Puno, 12,630, and La Paz, the capital of Bolivia, 12,226 feet above sea-level, are easily reached.

We will now return to the coast. The mean summer heat, in the shade, at Iquique:—8 A.M., 72°; noon, 78°; 8 P.M., 84°. Mean winter heat:—8 A.M., 63°; noon, 67°; 8 P.M., 62°. These low temperatures in 20° s. lat. are owing to the following causes:—

1st. The continuous south cold current (Humboldt's) running along the coast of the Pacific, of from 12 to 18 miles in the 24 hours.

2nd. The winds are mostly from the cool south.

3rd. At night, during the greater portion of the year, the terral, or land breeze from the Andes, is always cool.

4th. There is cloudy weather in the winter months, with north and north-west winds and thick mists, and rarely a slight drizzle or *garua*. The barometer is very steady in this portion of the Pacific.

When I first knew Iquique in 1826, there was seldom more than a hundred people there, and it was very healthy; but at Pica and Tarapacá, in the interior, at over 4000 feet above sea-level, and where there is water and vegetation, malaria was generated, giving rise to terciana or ague; at 6000 feet fever disappeared.

For some years past, about the month of June, this spot is visited by *peste*, of a bad bilious and yellow fever character, thought by some to be brought by the steamers from Panamá; however, others believe this *peste* is engendered on the spot. There is now a considerable population, the soil is sandy, and there is no drainage, to which must be added the ordure of thousands of animals that bring the nitrate from the refineries; then a hot sun on the soil-impregnated ground are sufficient causes for this, at times, fatal visitation of *peste*. Some idea of the great number of horses, mules, and asses that die at Iquique may be formed from the heaps of skeletons seen.

During the winter the gigantic cactus, 30 to 40 feet in height, and 10 to 15 feet at the base, thrives on the Lomas or summits of the mountains of the coast. I found the following live *Bulimi* on these plants: *B. virgulatus*, *B. erosus* and *Succinea broderipii*; and at the roots of the plant heaps of their dead shells.

A few bulbous and other plants appear at this season—the *Tiempo de Flores*—for the inhabitants of these dreary desert shores, who ascend to the Lomas to pic-nic and gather flowers, especially of blue and white lilies, and an oxalis of which a salad is made. When the drizzles have been plentiful, a very little pasture makes its appearance; then the Indian donkey-drivers take their animals up to the Lomas to nibble at fresh fodder.

Occasionally a stray huanaco and a fox may be met with; the mighty condor is seen hovering about, and the little slate-coloured bird the *Come sebo*, or Tallow-eater.

The following are the names of some of the plants I collected on my last visit,* kindly examined and named by Mr. Miers:—*Cleome chilensis* var. *pubesens*, *Talinum*, *Bryonia convolvifolia*, *Argylia feullei*, *Gilia* (?), *convolvulus*, *verbena*, *Lycium fragosum*, *Nolana atriplicifolia*, *Dolia vermiculata*, *Tetersena amæna*, *Sisyrinchium* (?), *Leucocoryne ixiodes*, *Notholaena remota*, *Usnea*, *Oxalis*, *Peperomia*, *Chenopodiaceæ*.

A severe earthquake shock is expected about every six or seven years, and felt all over the province. In 1795 as many as forty shocks were felt in one day. In 1818 a series were felt for fifteen days. The terrible terremotos of

* I presented those of my first to the late Mr. Lambert, which are now in the British Museum.

18th September, 1833, already alluded to, which destroyed Taena, had here the effect of calming the sea and dispersing the clouds.

I was at Macaya at 6270 feet, 2nd Feb., 1854. At 9 A.M., a rumbling noise was heard as if from the depths of the Andes, and then the shock of ten seconds; this was felt at Tirana in the Pampa of Tamarugal.

March 10th, 1854.—Being in the town of Tarapaca, 4210 feet, at the base of the Andes, I experienced a series of heavy shocks, commencing at 5.27 P.M., continuing at intervals for seven minutes. A revolution had broken out, volleys of musketry firing, people being killed and wounded whilst the shocks were going on. I sought shelter in the house of a friend; candles were burning before a crucifix, my friend's sister was kneeling and prayed before it, "O Lord God the Saviour! See, see Christ is angry at what is going on! Save us, Lord, save us!" This is known as the *Batalla del Temblor*. On the 4th April following I was at Iquique, when there was another fatal political fight, headed by one named Legay, this is called the *Batalla de los Asesinos*.

From my note-book, 1854:—

August 25th, 6 A.M., at Iquique.—Slight noise, a push, then a smart shock. 26th, 2.30 A.M.—Shock with pushing motion, which awoke me. Had there been another moment, I should have jumped up and made for the open pampa. 30th, 12.15 P.M.—Sharp shock. September 27th, at La Noriá, 4.30 P.M.—Sharp shock was felt at La Tirana same time. 28th, at La Tirana.—Sharp shock 9 P.M. October 9th.—At Iquique, 8.30 P.M.—Smart little earthquake from the land side. 19th, noon.—Sharp shock (felt same time at La Tirana); people flew out of their houses to the open ground, screaming "Miserecordia!" (About this period a volcano had burst out north of Copiapo, and the smoke of it seen from the port of Caldera). 23rd, noon.—Slight shock. 29th, 6 A.M.—Long and heavy shock; the rush of a long wave on the shore was heard, which was attributed to it.

Leaving the porphyritic rocks north of the town of Iquique, the shore of the Ansuelo pampa is reached, where there is a slightly elevated sandy ridge. Behind is a depression into which sea-water filters; this, mixing with dead shells there, of *Concholepas*, *Trochus*, *Mytilus*, *Venus*, *Mesodesma*, *Chitons*, *Balanas*, &c., decomposition of sea-water and shells takes place, when one of the products is a large quantity of a well-crystallised salt, principally a sulphate of lime. This spot is the narrow edge of an extensive shelly plain of elevation (not being uncommon on these coasts), which sweeps round Iquique going some distance inland. This great deposit of dead shells is called *Conchuelo*, and near the sea the shells are pretty perfect, but inland broken and in powder. In places they are 10 feet thick, and are burnt into lime for building purposes. It may be observed that very few shells are thrown up on this part of the coast at the present time.

From the Ansuelo rocks round to P. Piedra the whole distance is high, rocky, and escarped, in places over 2000 feet above the sea-level. Mr. David Forbes, F.R.S., tells me that what I have called granite here is diorite. There is a break in the Mountains of Guantaca, and here the diorite is seen in conjunction with the porphyry; the Cacti only grow on the crumbling diorite, and not on the hard porphyry.

The Island of Iquique, formerly thickly covered with Huano, is of porphyry, and appears to have been at one time a collection of rocks, the channels now filled up with broken shells, and there is a shelly elevation from 20 to 30 feet thick. The island is covered with rounded stones—may this not show that elevation is going on?

Six miles south-east from Iquique is Molle, a shipping-port for nitrate. The route to it is over the shelly plain, through sand-hills, to a more elevated shelly plain, having shelly cliffs at the port of Molle over 50 feet in height. There is no water except that of the sea, yet I observed abundance of flies,

mosquitoes, vinchuctas, lizards, rats, mice, scorpions, centipedes, and large fleas. The Sargasso, a gigantic sea-weed, is in great abundance.

The porphyritic coast of Molle is very steep, much of its lower portion deeply covered with disintegrated rock. In August, 1853, half a league from Mejillones ($19^{\circ} 15' \text{ s.}$), there was a great fall of disintegrated rock from the upper part of the mountain into the sea; this lasted several days, the noise was heard at Mejillones and clouds of dust seen in the air. In this fall of loose rock, bones of whales and other marine animals were found, some as high as 50 feet above sea-level.

Of the several excursions I made up into the mountains of the coast, I will particularize the exploration of the Morro of Tarapacá, its summit at least 6000 feet above sea-level. I was accompanied from Molle by my friend Dr. Bokenham. We journeyed on horseback to P. Grande early in the morning, ascending along the base of the mountain to a slope progressing zigzag upwards, and a hard pull-up it was, when we came upon an extensive, undulating, broken, sandy desert tract at least 3500 feet, the summit of the Morro being still more than 3 leagues off, which we did not feel inclined to go to, it being long past noon. Whilst resting we had a good look at this most desolate of scenes. Leading our horses we descended diagonally to the left a very steep portion of the Morro in the direction of the upper part of Molle. Scrambling up and down, our progress was often abruptly stopped by approaching the escarped sides of the coast. Bearing now to the right, descending very steep places, our course became unsafe, for, had we slipped, where we should have rolled to it is difficult to say. Here my companion's horse got away, when he followed it. I continued the descent, plunging repeatedly into deep loose stuff, and suffocated with the finer portions. At last I got to the bottom, when I saw my companion, but without his horse. The animal, I learnt, had got on a *Barranca*, or rocky ledge, and was a fixture. The following morning a *Vaqueano*, or good guide, managed to extricate the animal.

This mighty mass of a mountain, the Morro Grande of Tarapacá, appears to be entirely composed of red porphyry—say over 6000 feet thick.

Elevations above the Level of the Sea in the Province of Tarapacá, by Mr. George Smith in 1853, by Aneroid.

	Aneroid.	Feet.
Iquique	29'83	
Foot of Cuesta or zigzag		880
Summit of ditto		1,667
Meeting of roads to Molle		2,089
Top of a Cuesta		2,475
Road to Molle		2,385
End of Encañada—Noriá road leading to S. Rosa		3,045
Aguada de la Sal, Piedra Grande		2,830
Pintados, Alto de la Aguada del Sal		3,261
Alto del Meadero		3,303
La Noria, Nitrate Works at the Salar, the latitude of the Maquina $20^{\circ} 25' \text{ s.}$		3,277

Section from Pisagua, across the Mountains of the Coasts to the Northern Nitrate Works. By Mr. Cunningham, 1854, by Aneroid.

	Feet.
Port of Pisagua. 100 feet above sea-level the Aneroid stood at $29^{\circ}0023$.	
Brow of hill	1,660
First height in road	2,651
Hollow in road	2,372
Second height	2,997

Section from Pisagua—continued.

	Feet.
Second hollow	2,966
Third height	3,824
Third height, furthest point	4,984
Oficina Martinez (Sal de Obispo)	3,603
Oficina Tres Clavos	3,505
Sal de Obispo	3,505
Oficina Sal de Obispo	3,568
Oficinas of Rosario	3,784
Zapiga	3,721
Tiliviche stream	3,392
Top of ravine	3,656
Tana stream	3,132
Tana, N. bank	3,618
Pozo de los Salitres	3,500
Pozo de los Caliches	3,600
Brow of bank below Tana	3,556
Tana, lower down ravine	3,132
House at Tana	2,900
Point in plain of Zapiga	3,423
Stream at Quifina	3,527
Junction of Tana and Tiliviche streams	1,995
Junction of Pisagua and Zapiga ravine	1,042
Chacra of Saya, two leagues from Pisagua	726

Elevations from Mr. Smith's Survey of the Nitrate Grounds, 1856, by Aneroid.

	Feet.
Ravine of Quifina, near Guacucano Caliches	2,703
Cuesta of Huaina Pisagua	1,175
Cuesta on road	2,560
Ditto	2,877
Ditto	3,545
Junction of two roads	3,971
Burro Muerto, junction of two roads	3,753
Osorio Caliches (Sal de Obispo)	3,566
Zabala, I. M., Caliches	3,649
Tiliviche, Borate	3,273
Junin, heights on the coast	2,079
Cuesta above Conca, on the coast	1,765
Junction of roads	2,754
Heights of Cachasa, on the coast	2,480
Mejillones, on the coast	3,140
Cano y Obiedo, Caliches	3,547
La Carolina, Caliches (Sal de Obispo)	3,734
South of Mejillones, on road	635
Ditto Cuesta	2,540
Ditto Ditto	3,320
Mina, meeting of four roads	3,263
Another meeting of roads	3,613
Pampa de Orcoma	3,863
Ditto	3,340
Oyada, Caliches	3,566
Agua Santa, Oficina	3,502
Vernal, J., Ditto	3,566
Negreros, Ditto	3,612
Cuesta above P. Colorada	1,598
Pozo de Guara, Borate	3,517
Ramirez, Caliches	3,536
Yluga, entrance to Valley of Tarapacá	3,640
Town of Tarapacá	4,210

Elevations from Mr. Smith's Survey of the Nitrate Grounds, 1856—continued.

	Feet.
Iquique, top of Cuesta	1,667
Huantajaya Silver-mines, Town	2,877
Peña Abajo, W. side of P. Tamarugal	3,442
Molle, heights of	1,761
La Cruz, a cross on the road	2,368
Encañada, a ravine	3,045
Sebastopol, Oficina	3,291
La Noriá and Salar, Oficinas	3,277
Concepcion, S.E. of Noriá	3,673
La Calera, E. of Pampa	4,505
Matilla, town of, E. of Pampa	3,913
Salar Soronal, Caliches	2,593
Pan de Azucar, Caliches	3,223
Bella Vista, Caliches	3,280

Elevations taken by Mr. Williamson in 1859.

	Feet.
Town of Tarapacá	4,796
Pica	4,290
Mamiña	5,980
Macaya	6,270
Zipisa	10,250
Sotoca	10,351
Coscaya	9,075
Chiapa	10,542
Parina-cocha, Lake	13,576
Mauqué	14,342
Turima	14,178
Apacheta de Huascan (pile of stones)	14,430
Springs of Rio Pasirugo	14,079
Apacheta of Pusupucane or Chuncura	14,146
Lakes of Chuncura	15,448
Estancia of Colchani	13,956
La Rinconada	13,685
Estancia of Piga	13,784
Yabricoya, Mt. W. B.	18,000
Ditto the Ingenio	10,423
Mt. of Cuyacagua	14,364
Mt. of Lagunilla	14,470
Lakes of Huasco	12,350

Elevations by Boiling-point of Water, taken in 1863 by David Forbes, F.R.S.

	Feet.
Hospicio de Colon, top of Cuesta of Iquique	1,284
Huantajaya Mines, La Fuente's House	2,726
La Noriá Works	3,052
Quebrada de Pasos	3,146
La Tirana	3,332
Cancha de Montel (Chacra sin Riego)	3,209
Peña abajo	3,679
Ramirez, highest Oficina	4,205
Osorio Oficina	3,814
La Carolina Oficina	3,734
Highest point on road to Pisagua, beyond Burro Muerto	3,971

Latitudes and Longitudes observed by Mr. George Smith in 1826-7.

Port of Iquique, centre of island	20	12	30	S.	..	..	70	14	30	W.
Huantajaya	20	14	0	..	..	..	70	7	0	
Matilla	20	31	22							
Pica, church	20	30	8	..	..	..	69	24	0	
Huatacondo	20	57	51	..	..	..	69	0	3	
Mamiña	20	4	48	..	..	..	69	13	0	
Tarapacá, Town ..	19	56	0	..	..	..	69	35	0	
Zipisa	19	36	6	..	..	..	69	16	30	
Sotoca	19	36	18	..	..	..	69	15	30	
Chiapa	19	32	19	..	..	..	69	13	0	
Sibaya	19	47	33	..	..	..	69	9	0	
Pisagua, Pichalo Pt.	19	36	30	..	..	..	70	9	0	
Camina	19	17	9	..	..	..	69	18	0	
Loa	21	28	0	..	..	..	70	6	15	
Maní	21	10	0	..	..	..	69	14	0	
Tirana	20	21	27	..	..	..	69	43	30	
La Noriá, the Maquina, 1854	20	22	0	..	..	..	69	54	30	

2. *Remarks of M. LUCIEN DE PUYDT on the Discussion at the Evening Meeting of 13th January, in a Letter to the President.*

To SIR R. MURCHISON, Bart., *President of the Royal Geographical Society, London.*

SIR,

41, Rue de Douai, Paris, 21st February, 1868.

I received a few days ago the "Slip of Meeting" of the Royal Geographical Society for the 13th January, 1868, and I cannot thank you enough for the interest you have shown in my labours in the Isthmus of Darien.

But there is a point of the highest importance to which I must call your attention and that of the Society, as it seriously affects the possibility of cutting a ship-canal across the Isthmus of Darien. This is an erroneous statement, though evidently loyal and sincere, made by Captain Bedford Pim, against which it is my duty to protest.

I read in the slip:—

"Captain BEDFORD PIM. It was not his intention to enter into any criticism upon the exploration, because there was a practical difficulty in carrying out the canal scheme across that part of the Isthmus of Darien, which he thought was insurmountable. By the Panama Railway Concession, which has just been passed, dated the 16th of August, 1867, reforming the Contract of April 15th, 1850, the Government of New Granada had bound itself not to construct, or to concede to any person or company the right to construct, a railway or an oceanic canal in the territory to the westward of a line drawn from Point Escoces on the Atlantic to Point Garachine on the Pacific, which would include the Pacific terminus of M. de Puydt. So that, without the permission of the Panama Railway Company, it was impossible for any one to make a canal, even supposing," &c., &c.

In all this there is a profound mistake, not in the fact itself, but in the inferences drawn from it.

The following is an extract from the text of the Contract passed the 16th August, 1867, as printed in the 'Diario Oficial' of Bogotá:—

"El Gobierno no podrá comprender por sí, ni permitir que persona alguna comprenda sin acuerdo i consentimiento de dicha Compañía (Panama Railway

Company) la apertura o explotacion de nign canal maritimo que comunique los dos Oceanos al travis del espresado Istmo de Panama, al Oeste de la linea del Cubo Tiburon en el Atlántico i Punta Garachine en el Pacifico. Pero quedo estipulado que el derecho que se concede a la Compañia para su consentimiento, no se estiende a que pueda oponerse a la construccion de un canal al travis de l'Istmo de Panama (escepto en la ruta del Ferro-Carril), sino solamente, que pueda exigir un precio equitativo por tal privilegio, i como indemnizacion por los daños que pudiera sufrir la Compañia del Ferro-Carril por la concurrencia i la competencia del canal."

The position of the matter, according to this contract, is as follows:—

1st. It is prohibited to construct a canal on the line of the Railway of Panama, or within the lands conceded to the Company near the railway.

2nd. But the Government retains the right, and can concede the same to companies or an individual, to construct a ship-canal to the westward of the line drawn from Cape Tiburon to Point Garachine (except on the line of the railway) but with obligation to pay an equitable indemnity in favour of the Panama Railway Company.

3rd. It has an absolute right, and without exception, to construct a ship-canal to the eastward of the line aforesaid, without obligation to pay any indemnity to the Panama Company, but with this precise condition,—that the two termini, or any part of the canal, shall not pass to the westward of the line from Cape Tiburon to Point Garachine.

Now, the line of canal which I have proposed as a consequence of the exploration narrated in my paper, has its eastern terminus at Port Escondido, or at the mouth of Tanela River (Atlantic side), and the western one in the channel itself of the River Tuyra, near the mouth of Chucunaque River; this is about 20 miles distant to the eastward of the line of delimitation, where ceases the right of the Panama Railway Company.

It is, then, between those two extreme points that has been settled the delineation of the Columbian Canal. From the western terminus the navigation and "transit" are free, without any exception, and cannot be the subject of any privilege or restriction. The waters of rivers, lakes, &c., and their use, are the property of the Republic, and never could be alienated in favour of any person or company.

The "transit" by the channel of the Tuyra River is entirely free to every one, from the western terminus of the canal to the Pacific Ocean, crossing the Gulf of San Miguel.

The Panama Railway Company has, besides, offered conclusive proof of the existence of entire liberty to navigate the waters. The railway crosses through the two valleys of the *Chagres River* and *Rio Grande*, cuts many times and goes over these two rivers on various points: notwithstanding, the Company has no right, and does not exercise the right, to prevent the transport of men or wares by means of canoes, *pirogues*, rafts, &c. This daily transport has no great importance, it is true, but it is the sanction, upon a privileged territory, of the right of free navigation according to the laws of the Republic.

With regard to the heights, &c., given in my memoir, I stated that they were only approximate, and explained why I could do no more. I know perfectly well that a new survey by engineers and practical men would be necessary to determine in a definitive manner the height of the depression of the summit-level; but I confidently believe the altitudes I have given to be near the truth.

I would desire to state to the Royal Geographical Society, over which you preside, that if a new scientific expedition should be resolved upon in these

rich countries of the Isthmus, I would volunteer for the honour of being the guide to the new explorers through these forests, which I know well, having long lived in their midst.

I am, Sir, your most obedient Servant,

LUCIEN DE PUYDT.

3. *Progress of the French Survey Party in exploring the Sources of the Cambodia River.* Extracts from Reports by Colonel ALBERT FYTCHE, Chief Commissioner of British Burmah, to the Secretary to the Government of India.

Rangoon, 9th August, 1867.

I HAVE the honour to report, for the information of his Excellency the Viceroy and Governor-General of India in Council, that I have learnt that the French survey party, which left Saigon four or five months ago to explore the course of the Cambodia River, have reached the Shan States tributary to Yunan to the eastward of Bamo. They wrote from Mainglon or Maingla, to the Court of Ava, requesting permission to visit Mandalay, and a favourable reply has been sent, inviting them to visit the Burmese capital. The invitation to the party left Mandalay about the 31st July last.

The course laid down for the survey party was to ascend the Cambodia River, and follow its course along its banks as far as the Chinese frontier, and then to turn to the west, endeavouring to reach Bamo or some other place in the valley of the Irrawaddy. The town named Mainglon, or Maingla, is about north latitude $24^{\circ} 30'$ and east longitude $98^{\circ} 40'$, $98^{\circ} 15'$, $98^{\circ} 5'$, there being three towns named respectively Mainglon, Mainglon,* and Maingla, of the longitudes approximately given above. These towns are all on the main road from Tali, or Talifoo, *viâ* Yunchang to Bamo; the first of the three being on the route from Yunchang, Meinmo, and Bamo, the other two being on the route from Yunchang, Momein, and Sanda, or alternatively Moroun to Bamo. Practically, however, they are all much the same distance from Bamo, about a degree and a quarter to the eastward, and separated from that town only by the Kakhyen Hills. Their route up the Cambodia River must have been a successful one if they succeeded in following its course as high as Yunchang, the point from which they have apparently struck westward to Bamo.

27th January, 1868.

I HAVE to report that nothing has been heard of the party since its arrival at Kyan Hung. When at Mandalay I was informed that a letter had been received from the Tsanbwa of Kyan Hung, reporting the arrival of the mission there, and soliciting instructions whether the mission was to be allowed to pass through his territory, and his Majesty sent orders to the effect that they were to be permitted to proceed in any direction they pleased.

From no information having been received of their whereabouts since, I imagine they must have proceeded as far up the Cambodia River as possible, and then diverged into the track of the caravans, which leave the province of Sz'chuen yearly for the large trading mart of Hankow, situated at the mouth of the Han River, at its juncture with the Yangtse-Kyang.

A caravan has lately arrived at Mandalay, *viâ* Theinwee. They have heard nothing of the French mission; but this is not likely, if they have taken the route I now suppose they have, as the caravan comes from the north-western Yunan, whereas the French party, if it did pass through any part of Yunan, would traverse its south-eastern portion.

* Two towns of the same name.

4.—*Heights and Positions of the Principal Mountains and Hills of Iceland.*

By R. BROWN, Esq., F.R.G.S.

Name of Height.	Height above Sea in Danish Feet.	Latitude North.	Longitude W. of Copenhagen.	Longitude W. of Greenwich.	Remarks.
Oræfa Jökull ..	6241	64° 00' 48"	29° 20' 16"	16° 45' 29"	(or) Heljarfjall.
Eyja fjalla Jökull	5432	63° 37' 02"	32° 16' 18"	19° 41' 31"	
Herdubreid ..	5290	65° 10' 39"	28° 58' 55"	16° 24' 08"	
Hekla	4961	63° 59' 02"	32° 19' 02"	19° 44' 15"	
Snæfells Jökull ..	4577	64° 48' 04"	36° 25' 08"	23° 50' 21"	
Heljarf Jökull ..	3991	65° 48' 26"	31° 31' 56"	18° 56' 09"	
Mælifells Shnúkur	3476	65° 23' 30"	31° 59' 10"	19° 24' 23"	
Gláma	2872	65° 49' 46"	35° 40' 07"	23° 05' 20"	
Dránga Jökull ..	2837	66° 10' 32"	34° 55' 35"	22° 20' 48"	
Lómagnúpur ..	2455	63° 58' 57"	30° 09' 02"	17° 34' 15"	
Þríhyrningur ..	2387	63° 47' 00"	32° 36' 49"	20° 02' 02"	
Reydarfjall ..	1894	64° 55' 27"	26° 21' 13"	13° 46' 26"	
Ingólfsfjall ..	1742	63° 59' 37"	33° 39' 50"	21° 05' 03"	
Klofníngur ..	1598	65° 13' 04"	35° 05' 34"	22° 30' 47"	
Keilir	1239	63° 56' 21"	34° 48' 32"	22° 13' 45"	
Akrafjall ..	1160	64° 19' 00"	34° 36' 19"	22° 01' 32"	
Heimaklettur ..	916	63° 26' 53"	32° 53' 49"	20° 19' 02"	
Reynisfjall ..	765	63° 24' 46"	31° 39' 50"	19° 05' 03"	{ Vestman's Islands,
Hjörleifshöfði ..	740	63° 24' 56"	31° 22' 45"	18° 47' 58"	
Dyrhólaey ..	392	63° 23' 59"	31° 45' 57"	18° 11' 10"	Portland,
Ingólfshöfði ..	260	63° 48' 19"	29° 16' 16"	16° 41' 29"	

Note.—This table is computed for the most part from Professor H. C. F. C. Schjellerup's original observations made for *Iön Sigurdssyni's Icelandic Almanac* (*Almanak umáreptir Kristsföding 1867 semerhlaupár og annað ár eptir sum—arauka—reiknad eptir afstöðu Reykjavíkur á Íslandi—af H. C. F. C. Schjellerup, Professori en Íslenskad og lagad eptir Íslenzku tímatali af Ioni Sigurdssyni*). I have left the heights as they were originally taken, in Danish *Fod*—a measure so nearly equivalent to the English *foot*, that no good purpose in physical geography would be served by reducing it. The longitudes I have given as measured west of Copenhagen, but for the convenience of English geographers I have also reduced them to the meridian of Greenwich, taking the longitude of Copenhagen New Observatory as 12° 34' 47".5 E. of Greenwich (lat. 55° 40' 52".6 N.*), according to the observation adopted by the Konglige Kart Archiv in Copenhagen. As I can find no similar list in any English work, nor indeed the correct altitude or position of any one point in Iceland *correctly* given, I conceive that in the present form this table may be of some little value to English physical geographers.

ROBERT BROWN.

Copenhagen, Nov. 10th, 1867.

* The longitude in time of the University Observatory of Copenhagen is, according to the 'Nautical Almanac' ('Ast. Nach.,' vol. xix. 120), 0h. 50m. 19s.·8 E. of Greenwich, and lat. 55° 40' 53".0 N. ('Ast. Nach.,' vol. v. 366). In the above table I have omitted the decimals of seconds,

5. *The Auriferous and other Metalliferous Districts of Northern Queensland.* Extracts from a Paper read before the Royal Society of New South Wales, on 3rd September, 1867, by the Rev. W. B. CLARKE, M.A., F.G.S.

(Communicated by Sir GEORGE BOWEN, Governor of Queensland, through the COLONIAL OFFICE.)

A copy of this Paper sent to the Society was accompanied by a Despatch from Sir George Bowen, containing the following observations:—

“Brisbane, Queensland, 16th Sept., 1867.

“In commenting on this Paper, one of the leading journals of New South Wales (the ‘Sydney Morning Herald’) has observed that, as a perfect acquaintance with the scientific principles of geology enabled Sir Roderick Murchison, more than twenty years ago, to predict the future discovery of gold in Australia, so Mr. Clarke and other eminent geological observers have been able to point with similar certainty to various parts of this continent where a search for gold-fields might be prosecuted with success. By a careful study of the physical conformation of the country, combined with the minute observation and patient comparison of collateral facts, Mr. Clarke has, during a series of years, guided the exploring ‘digger,’ not only in New South Wales, but also in Victoria and Queensland, to places where gold exists in large natural deposits. These scientific predictions have been verified by the help of Mr. Daintree, formerly employed on the geological survey of Victoria. The observations of this gentleman are embodied in Mr. Clarke’s Paper now transmitted. The gold-bearing country indicated appears to be not less than 900 miles in length from south-east to north-west. It is stated that many of the auriferous spots are likely to prove very rich. The ‘Cape River Gold Field,’ in about latitude $20^{\circ} 30' \text{ s.}$, and longitude $145^{\circ} 30' \text{ E.}$, which has recently been proclaimed by my Government under the existing Gold Fields’ Act, is about 70 miles long by from 10 to 15 broad. The ‘diggings,’ already occupied by a considerable number of miners, are situated about 40 miles from the head of the Cape, and about 100 miles from the junction of that river with the Suttar, and about 200 miles inland from the seaport town of Bowen. It will be seen that Mr. Daintree has entered fully into the geology of this district, and has given some interesting information with respect to the Silurian rocks of Northern Queensland. He further observes that, ‘although the area of the auriferous rocks is considerable both on the Cape and Clarke Rivers (another of Mr. Clarke’s predictions), still it is small when compared with the extent of the old metamorphic gold-bearing slates of the Upper Gilbert,’ a river flowing into the Gulf of Carpentaria.

“It will be seen that Mr. Clarke’s Paper also treats of the discovery in Northern Queensland of iron and of copper in great purity and abundance. These ores are found in proximity with extensive beds of coal. Mr. Clarke remarks, in conclusion, that in bringing forward so extensive a subject, he had been compelled to be as brief as possible, but that ‘enough has been said on this occasion to show that our sister colony of Queensland has every reason to anticipate for her northern districts a future of success in the development of the metalliferous riches with which she has been endowed.’

Such development will, it is hoped, gradually take place through the introduction of English capital as the varied resources of this colony may become better known in the mother country. Meanwhile I venture to suggest that a copy of this despatch and of the enclosed paper should be forwarded to the Royal Geographical Society. The President of that Society, Sir Roderick

Murchison, cannot fail to be gratified by these proofs of the realisation by succeeding geologists of his own scientific predictions of the mineral wealth of Australia.

"I have, &c.,

"G. F. BOWEN."

EXTRACTS from the REV. MR. CLARKE'S PAPER.

In prefacing what I have to say upon one of the more immediate subjects of the present communication, it may be well to call attention to the striking fact that the great western interior of this continent is bounded to the eastward by a series of generally high insulated ranges, which preserve a nearly meridional direction on either side of the 140th degree of longitude.

Such is the great mass of the South Australian Ranges to the westward of that meridian, and such are the less lofty but rocky fastnesses of the Barrier and Grey ranges of Sturt to the eastward of it; and such also are the ranges at and above the head of the Cloncurry River of Burke and Wills, and that great range to the eastward of the latter, which was discovered by M'Kinlay, and which bears his name. This range is, in all probability, connected with the Barrier and Grey ranges of Sturt, as it is in direct prolongation of their strike.

The whole of these mountain masses are made up of ancient rocks of metalliferous character, and are surrounded by tertiary and post-tertiary deposits, which are partially auriferous, the detritus or drift having received its gold from the disintegration of the quartz veins which intersect certain portions of the older formations.

These ancient masses rise like fragmentary relics of islands (which, undoubtedly, they once were, in tertiary times) out of the present levels of the surrounding deserts, through which the drainages of the still more eastern Cordillera of New South Wales and Queensland diverge to south-west and north-west, transverse to each other in direction, but yet rudely parallel with the respective lines of the eastern and north-eastern coasts, which may be said, for convenience, to meet, as the general trends of the Cordillera do, between the 28th and 29th parallels of latitude. As the western coast of York Peninsula, though extremely low, is nevertheless well defined, and does not very considerably deviate from the general boundary of the South Australian masses along Spencer's and St. Vincent's gulfs—we may consider Eastern Australia to be a distinct and well-defined division of the continent; especially as we now know that the most western waters, which reach Spencer's Gulf to the south-west, and those which pass to the south-eastern corner of the Gulf of Carpentaria rise very near to each other,—countenancing an idea, which is not, however, yet established, that there was once a communication between those localities.

A careful inspection of the chart of Australia—now gradually but nevertheless rapidly being filled in—will show that the coast lines also rudely follow the strike of the main Cordillera and that a series of the lines drawn in their direction will divide the country into mathematical figures of a tolerably regular shape; in fact, no country is in this respect better defined than Australia.

Another feature of the physical conformation of Australia is the persistency with which certain of the older formations follow a geological strike along the meridian or within certain angular deviations from it; so that they recur in the same direction, where the denudation of younger overlying deposits exposes them to an outcrop, and this is most distinctly the case along the extension of the Cordillera to the westward nearly throughout Victoria.

It was this and other collateral facts which very much guided me in pointing out many years ago certain auriferous tracts not only in New South Wales proper, but in Victoria and Queensland, which both at that time belonged to this territory.

It is chiefly of the more westerly portion of these tracts that I have now to speak. In reply to inquiries of various correspondents and applicants in person relating to the Peak Downs district, I long ago advised them to carry their investigations towards the north-west, into and beyond the scrubs of the Suttor River, under the conviction that between that river and the bends of the Lynd there would be found an extension of the auriferous region. And this advice has been found to be in accordance with the results.

It may be proper to give a general geological sketch of the structure of that part of the country which is under discussion.

It will then be seen that in about 18° s., and between 144° and 145° e., the Burdekin and Lynd rivers of Leichhardt head in a gigantic range striking about N.N.E., the latter flowing to north-west, and the former south-easterly. This river flows through a tract of country occupied by granite, pegmatite, gneiss, talc-slate, mica-slate, and limestone, with quartz veins, porphyry, and basalt; being overlain by deposits of conglomerate and sandstone, which are intruded into and broken, contorted and altered by igneous rocks. The basalt, which seems to me, so far as I have examined it, to be as recent as that which forms the upper rock of that name in Victoria, occupies a plateau at the head of the rivers, and as far to the south as the Clarke River, in which it assumes in places the lava-like character which distinguishes much of the country near Melbourne.

Leichhardt and Gregory both describe the occurrence of these formations, and both speak of streams of lava. There can be no doubt then that it is a region of disturbance; the older formations being also highly inclined, and the newer horizontally bedded, these being also occasionally hardened and tilted.

From an examination of collections made by Leichhardt, Gregory, M'Kinlay, and other explorers, I could have no hesitation in believing that gold would exist in that region, otherwise so much in accordance with physical facts elsewhere observed.

Since Gregory's journey, the discoveries of Burke and Wills, and (in search of them) Walker's, M'Kinlay's, and Landsborough's, and still more recently the explorations of Jardine and Daintree have added much to our geological, as well as geographical knowledge of the region between the 141^{st} and 145^{th} meridians. The courses of the new rivers Norman and Einnasleigh which flows to the Staaten of the Dutch have been discovered, and adjustments of the Lynd and Gilbert have taken place somewhat in advance of Leichhardt's arrangement of those waters. We know now also that the waters of the Thomson, to which the Barcoo of Mitchell appears to be a tributary, and the Flinders rise in the same range, not more than from 170 to 200 miles from the Burdekin, and about 200 or 240 from the Cape River which was discovered by Leichhardt as a tributary of the Suttor, and which it enters not many miles from the junction of the latter with the Burdekin.

Within the limits of these boundaries, which by the Suttor is connected with Peak Downs, and then on to Broad Sound, Canoona, Rockhampton, Gladstone, the Don, the Mary, and Brisbane, we have various tracts of greater or less auriferous promise, those tracts cropping out amidst surrounding deposits of middle and upper palæozoic and secondary formations, and overlying areas of tertiary and post pliocene age. The range of country here indicated cannot be less than 900 miles in length from south-east to north-west; and although some of the auriferous spots may not be more rich than the immediate vicinity of Brisbane, yet there are others of a more important character, and even more so than any yet fully developed in Queensland. If, again, we take into account the Fanning River, Keelbottom Creek, Star Creek, and others westward and eastward of the Burdekin, there must undoubtedly be a vast amount of gold yet to be discovered, though, probably, at wide intervals. In this brief summary I do not mention with much expectation the abundant occur-

rence of such gold as was discovered by me in the quartz pebbles of the secondary fossiliferous rocks of Fitzroy Downs, because that fact may merely testify to the derivation of the quartz from auriferous reefs in secondary times (a very important deduction on another account), and recently an exploration by prospectors of the country 150 miles north-west of Roma, on the Fitzroy Downs, has not resulted in any discovery of alluvial gold, probably because that whole country is of secondary age.

If, however, we include Talgai and other places near the northern boundary of New South Wales, and some mentioned in my own reports, we shall see that Queensland offers ground for great expectation of auriferous wealth. With her coal-fields on the Isaac, the Mackenzie, the Bowen, and at Hervey's Bay, on the Bremer and the Brisbane, the Dawson and the Condamine, she becomes connected with similar coal deposits on the Clarence River, in New South Wales, and by her abundant wealth in copper and iron, bids fair to balance the present superior advantages of our own territory in coal and gold.

The occurrence of copper with gold in some localities in Queensland is also very remarkable. In other places the copper is so rich as to rival the wonderful masses of Lake Superior, the lodes being made up of little else than native copper, without any trace of gold. Whilst in other localities, again, the copper occurs distinct from, but in close proximity to an auriferous area. Such appears to be the case about Mount Wyatt, near the junction of the Burdekin and Suttor, as gold is scattered in the drift all the way to the Belyando.

This leads me back to the Cape River Gold-field.

The Cape River is merely indicated on the chart as entering the Suttor ; but it has lately been explored, where practicable, to its head, and stations are occupied between its junction and Hughenden, on the head of Jardine Creek, which is the Macadam River of Walker, and forms one chief head of the Flinders.

From the head of the Flinders, as I learn from another friend, gold may be found in small particles for some distance down the river, though Jurassic and Cretaceous rocks cover the older formations over a large area, as proved by the abundance of fossil shells, &c., and by remains of reptiles, as, for instance, at the base of Bramston Range, at Marathon, on Richmond Downs, on O'Connell Creek, and elsewhere. These rest upon the underlying palæozoic or older deposits which extend to the Burdekin and Suttor.

It is remarkable that Sir Thomas Mitchell should have turned back from the Belyando River, which would have led him to the Suttor, Cape, and Flinders rivers, and have given him his long desired approach to Carpentaria. Mr. Gregory did not see the junction ; but he tells us, what is most significant, that he passed over great abundance of drift, and of such a character as seems to be indicative, to a certain degree, of a gold region. Leichhardt also states that the ridges were covered with pebbles. Trap and porphyry occur not far off, and the rocks are often highly inclined.

It has been already stated that gold has been found at the head of the Flinders. Mr. Daintree reports to me that about 40 miles from the head of the Cape, and from 90 to 100 miles (direct, I presume) from the junction with the Suttor, on a tributary called "Betts's Mistake" Creek, the Cape River diggings are situated. He goes on to say :—

"The source of this branch of the Cape is from Mount Three Heads, so called from the fact that a tributary of Fletcher's Creek and Oxley Creek (a tributary of the Flinders) have their sources from the same hill. From Hann and Co.'s cattle-station on Fletcher's Creek, Mount Three Heads is distant 8 miles south, 38 west. Running down Oxley's Creek from its source to its junction with the Flinders, about 15 miles, gneiss, mica, and hornblende slate, with interstratified beds of quartzite, are found to occupy the whole distance.

"On the parallel and more northern tributary of the Flinders, called the

'Walker,' the gold-bearing metamorphic slates pass under the basaltic tablelands, and are hidden from sight. The lower 'Walker' may thus be assumed to be the north-western boundary of the Cape River series of auriferous rocks easily available to the miner.

"Looking from Mount Three Heads, towards the south-east, a broken country of hill and valley presents itself, a line of higher and more abrupt ridges marking the watershed. The creeks and gullies of this range, whether tributaries of the Cape, Flinders, or Betts's Mistake Creek, will, I believe, all be found to be auriferous, and many of them payable. The range itself follows nearly the strike of the metamorphic rocks of which it is composed, and especially at the south-eastern extremity. The dip is south-westerly. Between the upper Cape and Fletcher's Creek the ranges are of syenite. (I may mention here that this rock is a very good indication of gold. I have found it so in various parts of this colony, and in the part of Queensland under notice it is a prominent rock. Leichhardt noticed syenite at the head of the Lynd and on the Burdekin, in the hills below Mount M'Connell, which he thought was of domite, but Mr. Dalrymple has informed me it is granite. Mr. Gregory says that the summit of Mount M'Connell is marked by cliffs of porphyry, which also occurs on the right bank of the Suttor. These differences may be all reconciled, for syenite occasionally puts on a porphyritic appearance.)

"At the junction of Oxley Creek and the Flinders, on the east bank of the latter, cliffs of horizontal sandstone and conglomerate mark the boundary of what is called the 'desert country.' (Whether these rocks belong in part or at all to a carboniferous formation, Mr. Daintree does not state; but I have in my collections a coarse ferruginous quartz-grit from the table-land between the Cape and Flinders, and specimens of coal from the junction of Jardine's Creek, and fossilised wood from the delta of the Cloncurry and Flinders. These were brought to me by Mr. J. Atkinson. There is, therefore, a probability that coal-bearing beds do exist (a point on which Mr. Daintree expresses a doubt) below the fossiliferous secondary strata about O'Connell Creek, Walker's Creek, and Richmond Downs.)

"The cliffs above alluded to run parallel with the Cape range, and form the southern boundary of the auriferous belt under discussion.

"The area thus to be worked as 'Cape Diggings' will be 70 miles long by from 10 to 15 broad.

"It is bounded on the north-west by the lava of Walker's Plains; on the north by the syenite between Fletcher's Creek and the Cape; on the south by the sandstone and conglomerate of the desert. The south-eastern boundary is not yet determined: but it will be in that direction that deep leads will have to be looked for, the country being in that region flat as far as the junction with the Campaspe and the Cape, a distance of 50 or 60 miles.

"There were in the middle of July about 100 miners at work in two gullies called Specimen and Golden. The former of these rises in Mount Remarkable, an isolated hill at the south-eastern formation of the auriferous range which extends from Mount Three Heads."

Mr. Daintree, after confirming some other views of my own, gives a brief statement of the occurrence of Silurian rocks in Queensland. His opinion is that the Upper Silurian forms a belt from Brisbane to Broad Sound, extending to Maryborough and Rockhampton, the dip being at a high angle to north-east, and the strike parallel with the coast. Somewhat lower come in the Canoona and other gold-fields south-west of Maryborough, where the same Upper Silurian beds occur. On Perry's Range, Upper Burdekin, the dip is to south-west. These occur on the horizon of the Canoona field and represent the western side of an anticlinal, the summit of which has gone to form a portion of the enormous carboniferous formation, and as proved by the quartz in my fossiliferous Wollumbilla and Fitzroy Downs' auriferous calcareous rock, a portion of

the secondary formations that cover and conceal vast masses of the Lower Palæozoic or even older series of formations.

The only apparent difficulty in reconciling the age of the Silurian of the Broken River with that of the coast, is that the strike is there north to north-east, whilst to the south-eastward it is north-west. This difficulty may be overcome, if we regard the formation as mantling round a granitic axis. The slates of the Cape are represented as striking north-west, which ought to place them in the same category as the Silurian of the coast; the Broken River slates assume a more meridional direction.

I come now to a discovery by Mr. Daintree himself, in the extending of the northern gold-fields to the head of the Gilbert River. He says:—

“Although the area of the auriferous rocks is considerable both on the Cape and Clarke rivers, still it is small compared with the extent of the old metamorphic gold-bearing slates of the Upper Gilbert.

“The eastern tributaries of the Copperfield River, the western tributaries of M’Kinnon’s Lynd, the western and eastern tributaries of Jardine’s Einnasleigh River, all run through the mica-schists and other metamorphic formations.”

This is in close confirmation of the brief geological notices of Gregory and M’Kinlay.

The strike of the rocks in this region appear to have a trend to the eastward, according to the observations of Mr. Gregory; and this is confirmed by Mr. Daintree, who remarks as follows:—“The watershed between the Einnasleigh and the Burdekin, with several of the Upper Burdedin branch creeks, afford rock sections similar in every respect to the Cape diggings. As the main strike of the formation is north-easterly, and mica-schists are said to crop out on the coast at Endeavour River, and again on several parts of the Louisiade Archipelago, I think we may safely infer that auriferous tracts are continuous throughout, sometimes by large tracts of a horizontal sandstone series of unknown age, as on the upper portions of Leichhardt’s Lynd.”

Perhaps these inferences may be modified; but I have always expected another gold-field in the north, about the 144th meridian, on the heads of the Mitchell waters and the Kennedy River; nor is it unlikely that at the back of the east coast there are patches of auriferous country as far as 13° s.

The formations about Endeavour River are grey granite, schist, talc-slate, with quartz and flinty slate abutting on the granite; hornblende granite occurring in the Turtle Islands, off the coast, and in Lizard Island, whilst to the north of Endeavour River, west of Cape Flattery, a table-land comes in, with a trend to s.w. by w., and from 500 to 600 feet high. The coast about Cape Grafton consists of grey granite and a tourmaline rock of granitic character. Northward, in Trinity Bay, contorted talc-schist, with quartz veins occurs, dipping 60° to s.w. This gives a strike about n.w. Mica-slate, contorted, occurs in the Barnard Islands to the south. Granite also occurs at Cape Melville and at Cape Direction, with flinty rock at Cape Sidmouth, and trap between it and the mouth of the Kennedy, both occurring with granite. Quartz also occurs abundantly in the neighbourhood of Cleveland Bay, at the back of which gold has been found. The general character of the coast of the York Peninsula to the 13th parallel is, therefore in agreement with the country six degrees more south and to the east of the Burdekin. I have not been able to have any of the rocks in the region just named subject to assay; but with respect to those of the Louisiade Archipelago, certain of them, especially the quartz, were assayed for me at the Mint some years ago, but without finding any gold in them. They consisted of slate, porphyry, &c.

Mr. Daintree goes on to say:—“I have not Leichhardt’s work to refer to as to the Geology of Kirchner’s Range, but since it lies in the strike of the Gilbert mica-schists, it is probably a schistose barrier.”

On making reference, I find Leichhardt does not distinctly state what is its formation; but he mentions talc-schist to the south-east of it, with syenite passing into hornblende rock and with scattered quartz crystals. To the north-westward, granite and pegmatite occurred. The trend of the ranges on the east bank of the river appears to be north-easterly and easterly.

I suspect that there are two divisions of the old palæozoic rocks in the region under review, and that some of the supposed "metamorphic" rocks are transmuted Lower Silurian, or perhaps Huronian. If so, gold will, probably, be hereafter found.

Supposing that the preceding observations have been founded on sufficient data, then, regarding the general trend of the *divisio aquarum* from the granitic Bellenden Kerr Hills above Rockingham Bay, south-westerly through the heads of the Lynd and Gilbert to the ranges of Burke and Wills at the head of the Cloncurry, where quartz reefs are known to exist, I would venture to anticipate, hereafter, a development of auriferous country also in the neighbourhood of M'Kinlay's Range, and to the westward, especially as Wills points out a quartz reef, and as on Landsborough's country along the Gregory and O'Shanassy rivers, which also head along the previously indicated water-parting, there is abundance of basalt, which not only occupies a similar prominent position at the head of the Lynd, but also occurs in the Bramston Range, on the Flinders, and near to the head of the Barkly River, in an extensive table-land.

Independently of the well-known Peak Down or Mount Drummond mines, copper occurs at the Dee Mountain and in various other localities. Mr. Daintree, however, has added a fresh locality on the Lynd River.

The discoveries of gold and copper and other metals are not merely valuable to individual explorers, but belong to all the colonies in general. Those who work them, and those who profit by them, are of no particular section of the community, nor of any given member of the Australian provinces.

Copper, I may say, is very extensively developed; and iron still more so. The latter metal is, we already know, extremely abundant in Queensland, and magnificent specimens of ore from the neighbourhood of Port Curtis were exhibited in Paris at the first French International Exhibition. There are also in New South Wales vast masses of iron of far more solid character than the Fitzroy ore; and such I found in the explorations I made through the colony fifteen or sixteen years ago.

Looking at the whole of the phenomena represented by the features of that region, it is certain that Nature has been there in a very active state producing such combinations of galvanic, magnetic, and chemical forces. The iron also forms solid hills and cliffs rising out of a desert to 50 and 60 feet in broad ridges, and appearing under most picturesque forms. Imagine an explorer passing a night in a cavern in the very heart of a cliff of iron! The copper before us seems very much akin to that which occurs on Lake Superior in North America. Its hade is to the west; that of Peak Downs is to the south, and that of Daintree's Lynd mine to $\text{E. } 30^{\circ} \text{ S.}$ Inferences from what has been said in relation to the age of the formations in which these deposits occur may be drawn respecting the new finds.

The Lake Superior copper rocks are, however, Silurian. It is probable that the new copper mine in question may belong to a lower stage, perhaps as low as the Cambrian or (Huronian) itself. In each case eruptive rocks are present. Granite and mica-slate, with quartz veins holding micaceous iron and pyrites, are common rocks in the vicinity.

As showing how generally copper exists in the interior, we may notice that M'Kinlay mentions his having found copper during his journey through the wilderness.

PROCEEDINGS

OF

THE ROYAL GEOGRAPHICAL SOCIETY.

[ISSUED JULY 15TH, 1868.]

SESSION 1867-68.

Ninth Meeting, March 23rd, 1868.

SIR RODERICK I. MURCHISON, BART., K.C.B., PRESIDENT, in
the Chair.

ELECTIONS.—*Philip P. Blyth, Esq.* (J.P. for Middlesex); *Gilchrist Clark, Esq.*; *Charles Cornish-Brown, Esq.*; *James Douglas, Esq.*; *Capt. N. D. C. F. Douglas*; *John Lee, Esq.*; *John Moffitt, Esq.*; *Archibald Gilchrist Potter, Esq.*; *Thomas F. Quin, Esq.*; *Alderman David H. Stone*; *Howard Unwin, Esq.*; *Alexander Wilson, Esq.*; *James J. Wilkinson, Esq.*; *William Young, Esq.*

ACCESSIONS TO THE LIBRARY FROM MARCH 9TH TO MARCH 23RD, 1868.—‘*Plantæ Tinneanæ, sive Descriptio Plantarum in expeditione Tinneana ad flumen Bahr-el Ghasal, etc.*’ P. F. Tinné et J. A. Tinné. Donor, J. A. Tinné, Esq. ‘*History and Migration of Cultivated Narcotic Plants in Reference to Ethnology.*’ By J. Crawford, Esq. Donor, the author. ‘*Correspondence respecting Abyssinia, 1846-1868.*’ Parliamentary Paper. Purchased. ‘*Correspondence respecting Hostilities in the River Plate.*’ Parliamentary Paper. Purchased. ‘*Treatise on the Petroleum Zones of Italy.*’ By E. St. J. Fairman. Donor, the author. ‘*General View of the Frontier of Asia.*’ By M. Binieoff, St. Petersburg. Donor, the author.

ACCESSIONS TO THE MAP-ROOM SINCE THE LAST MEETING.—Map of the Republic of Nicaragua, by M. Sonnenstern. Presented by J. L. Hart, Esq., Consul-General. A Map showing the Route Survey of a Pundit from British India into Great Tibet through the Lhasa Territories and along the upper course of the Brahmaputra River. Presented by Captain T. G. Montgomerie, R.E., F.R.G.S. General Map of Europe, No. 12 of Stieler’s Hand-Atlas. Map of the

Basin of the Nile, by Dr. G. Schweinfurth. Map of the Balkash Lake, &c., by Babkow and Golubew. All presented by A. Petermann.

H.R.H. the PRINCE OF WALES and suite honoured the meeting with their attendance, and remained to the end of the discussion.

The PRESIDENT opened the meeting by saying that, before the paper was read, he was sure the Fellows of the Society would feel that it was the duty of their President to express the sincere gratification of the meeting that their Vice-Patron the Prince of Wales had been pleased to honour them with his presence. As a veteran in the pursuits of science he well remembered what real interest the lamented Prince Consort took in attending scientific meetings, and how justly he appreciated the importance of the discussions which arose at them. It was most gratifying therefore to find the Prince of Wales treading in the footsteps of his illustrious father. The presence of his Royal Highness at one of their ordinary meetings was not inappropriate, inasmuch as he had himself travelled more extensively than any former heir to the crown of England, and they might feel certain that he has formed a high estimate of that predominant feature in our national character, the keen desire to explore distant lands. As geographers they might feel proud that another son of our beloved Queen, the Duke of Edinburgh, already enrolled as one of their honorary members, was making the grand tour of the British colonies, and would have seen, when he happily returned, more of the earth's surface than the great majority of practised travellers.

The following Paper was read :—

Report on the Trans-Himalayan Explorations, in connexion with the Great Trigonometrical Survey of India, during 1865-7: Route-Survey made by Pundit —, from Nepal to Lhasa, and thence through the upper valley of the Brahmaputra to its Source. By Captain T. G. MONTGOMERIE, R.E., F.R.G.S.

[Extracts.]

A EUROPEAN, even if disguised, attracts attention when travelling among Asiatics, and his presence, if detected, is now-a-days often apt to lead to outrage. The difficulty of redressing such outrages, and various other causes, have, for the present, all but put a stop to exploration by Europeans. On the other hand, Asiatics, the subjects of the British Government, are known to travel freely without molestation in countries far beyond the British frontier; they constantly pass to and fro between India and Central Asia, and also between India and Tibet, for trading and other purposes, without exciting any suspicion.

In 1861 it was consequently proposed to take advantage of this facility possessed by Asiatics, and to employ them on explorations beyond the frontier. The Government of India approved of the project, and agreed to support it liberally.

With a view to carry out the above, Colonel Walker, the Superintendent of the Survey, engaged two Pundits, British subjects, from

one of the upper valleys of the Himalayas. Such promising recruits having been secured, they were at once sent to the head-quarters of the Great Trigonometrical Survey, in order to be trained for Trans-Himalayan exploration.

On Colonel Walker's departure for England, these Pundits were put under Captain Montgomerie, who completed their training. They were found to be very intelligent, and rapidly learnt the use of the sextant, compass, &c., and before long recognised all the larger stars without any difficulty. Their work, from actual practice, having been found to be satisfactory, Captain Montgomerie directed them to make a route-survey from the Mansarowar Lake to Lhasa, along the great road that was known to exist between Gartokh and Lhasa. From Lhasa, they were directed to return by a more northerly route to Mansarowar. The route to Lhasa was selected by Captain Montgomerie, because it was known, from native information, to be practicable as far as the road itself was concerned. If explored, it was likely to define the whole course of the great river known to flow from near the Mansarowar Lake to beyond Lhasa. Hitherto the sole point on the upper course of this great river, the position of which was known with any certainty, was a point near Teshooloomboo, or Shigátze, as determined by Captain Turner in 1783. The position of Lhasa, the capital of Great Tibet, was, moreover, only a matter of guess, the most probable determination having been derived from native information as to the marches between Turner's Teshooloomboo and Lhasa. In fact, the route from the Mansarowar Lake to Lhasa, an estimated distance of 700 or 800 miles, was alone a capital field for exploration.

An attempt was made by the Pundits to advance direct from Kumaon, *viâ* Mansarowar, to Lhasa, but they did not find it practicable. The attempt by the Mansarowar Lake having failed, it appeared to Captain Montgomerie that the best chance of reaching Lhasa would be through Nepal, as the Nepalese Government has always maintained relations of some kind with the Government of Lhasa. Traders from Nepal, moreover, were known to visit Lhasa, and Lhasa traders to visit Nepal.

The Pundits were consequently ordered to go to Kathmandû, and from thence to try and make their way to the great road between the Mansarowar and Lhasa. Their instrumental equipment consisted of 2 large sextants,* 2 box sextants, prismatic and pocket compasses, thermometers for observing temperature of air and of boiling water, pocket chronometer, and common watch, with apparatus, the latter reduced as much as possible.

* Only one large sextant was taken to Lhasa.

The Pundits started from Dehra, reached Moradabad on the 12th January, and Bareilly on the 23rd January, 1865. They crossed the Nepalese frontier at Nepalgunj, Jung Bahadur's new town, and from thence went by the Cheesaghurri road to Kathmandû, reaching the latter place on the 7th March, 1865.

In Kathmandû they made inquiries on all sides as to the best route to Lhasa; they found that the direct one by Kûti (or Nilum), across the Dingri plain (or Tingri Maidan, as it is called), was likely to be very difficult, if not impassable, owing to the snow at that early season (March, April). They consequently determined to try the route by Kirong, a small town in the Lhasa territory, as that route was said to be passable earlier than the Kûti route. Having made their arrangements, the Pundits started full of hope on the 20th March, 1865, accompanied by four men, whom they had hired as servants.

On the 26th they reached Medangpodo village, and here they changed their mode of dress to one better known to the people of Lhasa. They also gave out that they were Bisahiris,* and were going to buy horses, at the same time to do homage at the Lhasa shrine. The character of Bisahiris was assumed because they knew that those people had from time immemorial been privileged to travel in the Lhasa territory without question. On the 28th March they reached the neighbourhood of Kirong, but, much to their disappointment, they were stopped by the Chinese officials, who questioned them as to the object of their journey, and searched their baggage. Fortunately the instruments (which had been ingeniously secreted in a false compartment of a box) escaped detection; but still, though nothing suspicious was seen, the plausible reasons given for the journey did not satisfy the jealousy of the Chinese authorities. In spite of everything urged, they were not allowed to pass until a reference had been made to the Kirong governor. The Kirong governor seems at once to have noted the weak points of their story, and having pointed them out with inexorable logic, declined to let them pass on any consideration; they were therefore reluctantly forced to retrace their steps to Shabrû. At Shabrû the wily Pundit managed to persuade a high official that they were no impostors, and induced him, moreover, to certify that in a letter to the Kirong governor. Armed with this letter, they returned towards Kirong, with hopes of better luck, and no doubt, under ordinary circumstances, would have succeeded; but on the road they fortunately discovered that the Kirong governor was an individual who

* From the British valley of that name north-east of Simla.

had known the Pundit's brother personally, when he was chief of Taglakote, near Mansarowar; his brother had in fact been frequently in close and friendly relations with him. This at once put a stop to all hopes of his advancing by the Kirong route, as the governor well knew he was no Bisahiri. The other Pundit thought of proceeding by himself, but, being able to devise no feasible method, he gave up the idea, and the party consequently marched back, reaching Kathmandû on the 10th April. Here they made fresh inquiries as to some more promising way of getting to Lhasa. At last they heard of two opportunities, the first by accompanying the camp of a new agent (vakeel) that Jung Bahadur was about to send to Lhasa, and the second by accompanying a Bhot merchant. In order to increase their chances of success, they decided that one should go with the Nepal agent, and the other with the merchant. The vakeel at first agreed to take one of them with him, but ultimately refused.

Failing with the vakeel, it was impossible for the Pundit, who was known to the Kirong governor, to go with the Bhot merchant, as he intended to take the Kirong route; he consequently decided to try a more circuitous route, by Muktinâth, but in this he failed, owing, according to his own account, to loss of health and the unsafe state of the roads, but, no doubt, in a great measure due to his own want of determination. After a long journey through the upper parts of the Nepal territory, he returned to British territory. The account of his proceedings is referred to separately. The other Pundit, at first, was not much more successful with the merchant than his brother had been with the vakeel. The merchant, Dawa Nangal, promised to take the Pundit to Lhasa, and on the strength of that proceeded to borrow money from him. The merchant, however, put off starting from day to day, and eventually the Pundit had to start with one of the merchant's servants, the merchant himself promising to follow in a few days. The Pundit assumed the dress of a Ladâki, and, to complete his disguise, added a pig-tail to his head. This change was made because he was afraid that the Kirong officials who stopped him the first time might recognise him again.

By this means he reached Tadûm monastery, a well-known halting-place on the great road between Lhasa and Gartokh. Starting on the 13th August from Kirong, he reached Lue on the 23rd. From Kathmandû up to this point vegetation and jungle had been abundant, but, beyond, the mountains were throughout bare and all but barren.

On the 24th August the Pundit joined a large trading party, travelling *viâ* Tadûm to Mansarowar, and was allowed to accompany

them. On the 30th he reached Talla Labron, and there first caught sight of the great river* that flows towards Lhasa. His first acquaintance with this river was calculated to inspire him with respect for it, as three men were drowned in front of him by the swamping of a ferry-boat. Alarmed by this occurrence, the party marched a short distance farther up the river to a better ferry, by which they crossed in safety to the Tadúm monastery on the 6th of September. At Tadúm the Pundit feigned sickness as a reason for not going on to Mansarowar, and he was accordingly left behind. Continuing to feign illness, he at last found an admirable opportunity of going to Lhasa, viz., by accompanying a Ladák merchant in the employ of the Kashmir Maharaja, who was that year going to Lhasa, and was to pass through Tadúm. On the 2nd of October the merchants' head man, Chiring Nirpal, arrived, and on hearing the Pundit's story, at once consented to take him on to Lhasa. Starting on the next morning with the Ladáki camp, he marched eastward along the great road, reaching the town of Sarkajong on the 8th October. So far everything had gone smoothly, but here the inquiries made by the authorities rather alarmed the Pundit, and as his funds, owing to the great delays, had begun to run short, the two combined made him very uneasy. However, he manfully resolved to continue his journey. He became a great favourite with Chiring Nirpal and the whole of the Ladáki camp. On the 19th October they reached Ralang. From Tadúm to this point no cultivation was seen, but here there was a little, and a few willow-trees, and onwards to Lhasa cultivation was met with nearly every day.

On the 29th October they reached Digarcha, or Shigátze, a large town on the Penanangchú River near its junction with the great Nárichú River. The only incident during their long stay there was a visit that he and the Ladákis paid to the great Tashilumbo monastery. This monastery lies about half a mile south-west of the city, and is the same as that visited and fully described by Turner. The Pundit would rather not have paid the Lama a visit, but he thought it imprudent to refuse, and therefore joined the Ladákis, who were going to pay their respects to him. The Pundit confesses that, though personally a follower of Brahma, the proposed visit rather frightened him, as, according to the religion of his ancestors, who were Buddhists, the Lama ought to know the secrets of all hearts. However, putting a bold face on the matter, he went, and was much relieved to find that the Lama, a boy of 11, only

* The Brahmaputra.

asked him three simple questions, and was, according to the Pundit, nothing more than an ordinary child, and did not evince any extra intelligence. At Shigátze the Pundit took to teaching Nepalese shopkeepers the Hindoo method of calculation, and thereby earned a few rupees.

The great road, which had hitherto been more or less close to the great Náríchú River, from Shigátze goes considerably south of that river. On the 25th December they reached the large town of Gyangze, on the Penanangchú River, which was then frozen hard enough to bear men. Crossing the lofty Kharola mountains, they arrived on the 31st December at Nang-ganchejong, a village on the Yamdokcho Lake, with the usual fort on a small hill. For two days the Pundit coasted along the Great Yamdokcho Lake.* On the second day he nearly fell a prey to a band of robbers, but, being on horseback,† he managed to escape, and on the 2nd January reached Demálang, a village at the northern angle of the lake. From Demálang the lake was seen to stretch some 20 miles to the south-east. The Pundit estimated the circumference of the lake to be 45 miles, but, as far as he saw, it was only 2 to 3 miles in width. He was informed that the lake encircled a large island, which rises into low rounded hills 2000 or 3000 feet above the surface of the lake. These hills were covered with grass up to the top. Between the hills and the margin of the lake several villages and a white monastery were visible on the island. The villagers keep up their communication with the mainland by means of boats. The Pundit was told that the lake had no outlet, but, as he says its water was perfectly fresh, that is probably a mistake; if so, the Pundit thinks the outlet may be on the eastern side, where the mountains appeared to be not quite so high as those on the other sides. The evidence as to the lake encircling a very large island is unanimous. Almost all former maps, whether derived from the Chinese maps made by the Lamas, or from native information collected in Hindustan, agree in giving the island a very large area, as compared with the lake in which it stands. This is, however, a very curious topographical feature, and as no similar case is known to exist elsewhere, it might perhaps be rash to take it for granted, until some reliable person has actually made the circuit of the lake. Meantime the Pundit's survey goes a considerable way to confirm the received theory. The lake, from the Pundit's observations, appears to be about 13,500 feet above the sea;

* The margin of the lake was frozen.

† With reference to this, the Pundit, on being questioned, said that the paces of this portion, and of one or two other parts, were counted on his return journey.

it contains quantities of fish. The water was very clear, and said to be very deep.

The island in the centre must rise to 16,000 feet above the sea, an altitude at which coarse grass is found in most parts of Tibet.

From the basin of the Yamdokcho Lake the party crossed over the Khambala mountains by a high pass, reaching the great Nárichú (the Brahmaputra) at Khambabarche; from thence they descended the river in boats to Chusul village. Near Chusul they again left the great river, and ascending its tributary, the Kichu Sangpo or Lhasa River, in a north-easterly direction reached Lhasa on the 10th of January, 1866.

The Pundit took up his abode in a sort of caravanserai with a very long name, belonging to the Tashilumbo monastery; he hired two rooms that he thought well suited for taking observations to stars, &c., without being noticed. Here he remained till the 21st of April, 1866. On one occasion he paid a visit to the Golden Monastery, two marches up the great road to China, which runs from Lhasa in a north-easterly direction. He also attempted to go down the Brahmaputra, but was told that it was impossible without a well-armed party of a dozen at least. His funds being low, he was obliged to give up the idea, and indeed, judging from all accounts, doubted if he could have done it with funds. The Pundit's account of the city of Lhasa agrees, in the main, with what has been written in Messrs. Huc and Gabet's book as to that extraordinary capital, which the Pundit found to be about 11,400 feet above the sea. He particularly dwells upon the great number, size, and magnificence of the various monasteries, and the vast number of monks, &c., serving in them.

Having been so long away, the Pundit's funds had arrived at a very low ebb, and he was obliged to make his livelihood by teaching Nepalese merchants the Hindoo method of accounts. By this means he got a little more money, but the merchants, not being quite so liberal as those of Shigátze, chiefly remunerated him by small presents of butter and food, on which he managed to subsist. During his stay in Lhasa the Pundit seems to have been unmolested, and his account of himself was only once called in question. On that occasion two Mahomedans of Kashmiri descent managed to penetrate his disguise, and made him confess his secret. However, they kept it faithfully, and assisted the poor Pundit with a small loan, on the security of his watch. On another occasion the Pundit was surprised to see the Kirong governor in the streets of Lhasa. This was the same official that had made so much difficulty about letting him pass Kirong; and as the Pundit had (through Chúngh

Chú) agreed to forfeit his life if, after passing Kiron, he went to Lhasa, his alarm may easily be imagined. Just about the same time the Pundit saw the summary way in which treachery was dealt with in Lhasa: a Chinaman, who had raised a quarrel between two monasteries, was taken out and beheaded without the slightest compunction. All these things combined alarmed the Pundit so much that he changed his residence, and from that time seldom appeared in public.

Early in April the Pundit heard that his Ladáki friends were about to return to Ládak with the tea, &c., that they had purchased. He forthwith waited on the Lopchak, and was, much to his delight, not only allowed to return with him, but was told that he would be well cared for, and his expenses paid *en route*, and that they need not be repaid till he reached Mansarowar. The Pundit, in fact, was a favourite with all who came in contact with him.

On the 21st April he left Lhasa with the Ladáki party, and marching back by the great road as before, reached Tadúm monastery on the 1st of June.

From Tadúm he followed the great road to Mansarowar, passing over a very elevated tract of country from 14,000 to 16,000 feet above the sea, inhabited solely by nomadic people, who possess large flocks and herds of sheep, goats, and yaks. On the road his servant fell ill, but his Ladáki companions assisted him in his work, and he was able to carry it on. Crossing the Mariam-La mountains, the watershed between the Brahmaputra and the Sutlej, he reached Darchan, between the Mansarowar and the Rakas Tâl, on the 17th of June. Here he met a trader from British territory who knew him, and at once enabled him to pay all his debts, except the loan on his watch, which was in the hands of one of the Ladákis. He asked his friends to leave the watch at Gartokh till he redeemed it.

At Darchan the Pundit and his Ladáki companions parted with mutual regret; the Ladákis going north towards Gartokh, and the Pundit marching towards the nearest pass to the British territory, accompanied by two sons of the man who had paid his debts.

The Pundit's servant, a faithful man from Záskar in Ládak, who had stuck to him through the journey, being ill, remained behind. He answered as a sort of security for the Pundit, who promised to send for him, and at the same time to pay all the money that had been advanced. Leaving Darchan on the 20th June, the Pundit reached Thájung on the 23rd, and here he was much astonished to find even the low hills covered with snow in a way he had never seen before. The fact being that he was approaching the outer Himalayan chain, and the ground he was on (though lower than

much of the country he had crossed earlier in the season) was close enough to the outer range to get the full benefit of the moisture from the Hindustan side. The snow rendered the route he meant to take impracticable, and he had to make a great *détour*. After an adventure with the Bhotiyas, from whom he escaped with difficulty, he finally crossed the Himalayan range on the 26th June, and thence descended into British territory after an absence of 18 months. As soon after his arrival as possible, the Pundit sent back two men to Darchan, with money to pay his debts, and directions to bring back his servant. This was done, and the servant arrived all safe, and in good health.

The Pundit met his brother, who, failing to make his way to Lhasa, had returned by a lower road through the Nepalese territory. This brother had been told to penetrate into Tibet, and, if possible, to assist the Pundit. The snow had, however, prevented him from starting. He was now, at the Pundit's request, sent to Gartokh to redeem the watch, and to carry on a route-survey to that place. The Pundit handed over his sextant, and told him to connect his route with the point where the Bhotiyas had made the Pundit leave off. The brother succeeded in reaching Gartokh, redeemed the watch, and after making a route-survey from the British territories to Gartokh and back, he rejoined the Pundit, and they both reached the head-quarters of the Survey on the 27th of October, 1866.

During the regular survey of Ladák, Captain Montgomerie had noticed that the Tibetans always made use of the rosary and prayer-wheel,* he consequently recommended the Pundit to carry both with him, partly because the character of a Buddhist was the most appropriate to assume in Tibet, but, still more, because it was thought that these ritualistic instruments would (with a little adaptation) form very useful adjuncts in carrying on the route-survey.

It was necessary that the Pundit should be able to take his compass bearings unobserved, and also that, when counting his paces, he should not be interrupted by having to answer questions. The Pundit found the best way of effecting those objects was to march separate, with his servant either behind or in front of the rest of the camp. It was of course not always possible to effect this, nor could strangers be altogether avoided. Whenever people did come up to the Pundit, the sight of his prayer-wheel was generally sufficient to prevent them from addressing him. When he saw any one

* The mani-chuskor, or prayer-wheel.

approaching, he at once began to whirl his prayer-wheel round, and as all good Buddhists whilst doing that are supposed to be absorbed in religious contemplation, he was very seldom interrupted.

The prayer-wheel consists of a hollow cylindrical copper box, which revolves round a spindle, one end of which forms the handle. The cylinder is turned by means of a piece of copper attached by a string. A slight twist of the hand makes the cylinder revolve, and each revolution represents one repetition of the prayer, which is written on a scroll kept inside the cylinder.* The prayer-wheels are of all sizes, from that of a barrel downwards; but those carried in the hand are generally four or six inches in height by about three inches in diameter, with a handle projecting about four inches below the bottom of the cylinder. The one used by the Pundit was an ordinary hand one, but instead of carrying a paper scroll with the usual Buddhist prayer "Om mani padmi hom," the cylinder had inside it long slips of paper, for the purpose of recording the bearings and number of paces, &c. The top of the cylinder was made loose enough to allow the paper to be taken out when required.

The rosary, which ought to have 108 beads, was made of 100 beads, every tenth bead being much larger than the others. The small beads were made of a red composition to imitate coral, the large ones of the dark corrugated seeds of the udrâs. The rosary was carried in the left sleeve; at every hundredth pace a bead was dropped, and each large bead dropped, consequently, represented 2000 paces. With his prayer-wheel † and rosary the Pundit always managed one way or another to take his bearings and to count his paces.

The latitude observations were a greater difficulty than the route-survey. The Pundit required to observe unseen by any one except his servant; however, with his assistance, and by means of various pretences, the Pundit did manage to observe at thirty-one different places. The Pundit had invested in a wooden bowl,‡ such as is carried at the waist by all Bhotiyas. This bowl is used by the Bhotiyas for drinking purposes; in it they put their water, tea,

* This prayer is sometimes engraved on the exterior of the wheel.

† The Pundit found this prayer-wheel free of all examination by custom-house or other officials. In order to take full advantage of this immunity, several copper prayer-wheels have been made up in the workshop of the Survey, fitted for compasses, &c.: these will be described hereafter.

‡ The Tibetans are very curious as to these drinking bowls or cups; they are made by hollowing out a piece of hard wood, those made from knots of trees being more especially valued. A good bowl is often bound with silver. The wood from which they are made does not grow in Tibet, and the cups consequently sell for large amounts.

broth, and spirits, and in it they make their stirabout with dry flour and water, when they see no chance of getting anything better. The Pundit, in addition, found this bowl answer capitally for his quicksilver, as its deep sides prevented the wind from acting readily on the surface. Quicksilver is a difficult thing to carry, but the Pundit managed to carry his safely nearly all the way to Lhasa, by putting some into a cocoa-nut, and by carrying a reserve in cowrie-shells closed with wax. At Piáhtjong, however, the whole of his quicksilver escaped by some accident; fortunately he was not far from Lhasa, where he was able to purchase more. The whole of his altitudes were taken with the quicksilver.

Reading the sextant at night without exciting remark was by no means easy. At first a common bull's-eye lantern answered capitally, but it was seen and admired by some of the curious officials at the Tadúm monastery, and the Pundit, who said he had brought it for sale, was forced to part with it, in order to avoid suspicion. From Tadúm onwards a common oil-wick was the only thing to be got. The wind often prevented the use of it, and, as it was difficult to hide, the Pundit was at some of the smaller places obliged to take his night observation, and then put his instrument carefully by, and not read it till the next morning; but at most places, including all the more important ones, he was able to read his instrument immediately after taking his observations.

The results of the expedition delivered at the head-quarters consist of—

1st.—A great number of meridian altitudes of the sun and stars, taken for latitude at thirty-one different points, including a number of observations at Lhasa, Tashilumbo, and other important places.

2nd.—An elaborate route-survey, extending over 1200 miles, defining the road from Kathmandû to Tadúm, and the whole of the Great Tibetan road from Lhasa to Gartokh, fixing generally the whole course of the great Brahmaputra River, from its source near Mansarowar to the point where it is joined by the stream on which Lhasa stands.

3rd.—Observations of the temperature of the air and boiling water, by which the heights of thirty-three points have been determined, also a still greater number of observations of temperature, taken at Shigátze, Lhasa, &c., giving some idea of the climate of those places.

4th.—Notes as to what was seen, and as to the information gathered during the expedition.

The latitude observations were taken with a large sextant of 6-inch radius, and have been reduced in the Computing Office of

the Survey. There is no doubt but that the Pundit is a most excellent and trustworthy observer. In order to see this it is only necessary to look at the accompanying list.

Between the Mansarowar Lake and Lhasa the Pundit travelled by the great road called the Johng-lam * (or Whor-lam), by means of which the Chinese officials keep up their communications, for 800 miles along the top of the Himalayan range; from Lhasa, north of Assam, to Gartokh, north-east of Simla. A separate memorandum is given hereafter as to the stages, &c., on this extraordinary road. Starting from Gartokh on the Indus, at 15,500 feet above the sea, the road crosses the Kailas range by a very high pass, descends to about 15,000 feet in Narí Khorsum, the upper basin of the Sutlej, and then coasting along the Rakas Tâl, the Mansarowar, and another long lake, rises gradually to the Mariham-la Pass, the watershed between the Sutlej and Brahmaputra, 15,500 feet above the sea. From the Mariham-la the road descends gradually, following close to the north of the main source of the Brahmaputra, and within sight of the gigantic glaciers, which give rise to that great river. About 50 miles from its source the road is for the first time actually on the river, but from that point to Tadúm it adheres very closely to the left bank. Just before reaching Tadúm the road crosses a great tributary, little inferior to the main river itself. The Tadúm monastery is about 14,200 feet above the sea.

In many parts there appears to have been considerable danger of losing the road in the open stretches of the table-land, the whole surface looking very much like a road; but this danger is guarded against by the frequent erection of piles of stones, surmounted with flags on sticks, &c. These piles, called lapcha by the Tibetans, were found exceedingly handy for the survey; the quick eye of the Pundit generally caught the forward pile, and even if he did not, he was sure to see the one behind, and in this way generally secured a capital object on which to take his compass bearings. The Tibetans look upon these piles partly as guide-posts, and partly as objects of veneration; travellers generally contribute a stone to them as they pass, or, if very devout and generous, add a piece of rag; consequently, on a well-used road, these piles grow to a great size, and form conspicuous objects in the landscape. Over the table-land the road is broad and wide enough to allow several travellers to go abreast; in the rougher portions the road generally consists of two or three narrow paths, the width worn by horses, yaks, men, &c., following one another. In two or three places these dwindle down to a single track, but are always passable by a horseman, and,

* Lam means road in the Tibetan language.

indeed, only in one place, near Phuncholing, is there any difficulty about laden animals. A man on horseback need never dismount between Lhasa and Gartokh, except to cross the rivers.

The road is, in fact, a wonderfully well maintained one, considering the very elevated and desolate mountains over which it is carried. Between Lhasa and Gartokh there are twenty-two staging places, called Tarjums, where the baggage-animals are changed. These Tarjums are from 20 to 70 miles apart; at each, shelter is to be had, and efficient arrangements are organised for forwarding officials and messengers. Each Tarjum is in charge of an official, called Tarjumpá, who is obliged to have horses, yaks, and coolies in attendance whenever notice is received of the approach of a Lhasa official. From ten to fifteen horses, and as many men, are always in attendance night and day. Horses and beasts of burden (yaks in the higher ground, donkeys in the lower) are forthcoming in great numbers when required; they are supplied by the nomadic tribes, whose camps are pitched near the halting-houses.

Though the iron rule of the Lhasa authorities keeps this high road in order, the difficulties and hardships of the Pundit's march along it cannot be fully realised, without bearing in mind the great elevation at which the road is carried. Between the Mansarowar Lake and the Tadúm monastery the average height of the road above the sea must be over 15,000 feet, or about the height of Mont Blanc. Between Tadúm and Lhasa its average height is 13,500 feet; and only for one stage does the road descend so low as 11,000 feet, whilst on several passes it rises to more than 16,000 feet above the sea. Ordinary travellers with laden animals make two to five marches between the staging-houses, and only special messengers go from one staging-house to another without halting. Between the staging-houses the Pundit had to sleep in a rude tent that freely admitted the biting Tibetan wind, and on some occasions he had to sleep in the open air.

Bearing in mind that the greater part of this march was made in mid-winter, it will be allowed that the Pundit has performed a feat of which a native of Hindustan, or any other country, may well be proud.

From the Mansarowar Lake to Tadúm (140 miles) glaciers seem always to have been visible to the south, but nothing very high was seen to the north; for the next 70 miles the mountains north and south seem to have been lower, but further eastward a very high snowy range was visible to the north,* running for 120 miles parallel

* With a very high peak at its western extremity, called Harkiang. A very high peak was also noticed to the south, between the Raka and Brahmaputra valleys.

to the Raka Sangpo River. From Janglache to Gyangze the Pundit seems to have seen nothing high, but he notices a very large glacier between the Pennang Valley and the Yamdokcho Lake.

From the lofty Khamba-la Pass the Pundit got a capital view. Looking south he could see over the island in the Yamdokcho Lake, and made out a very high range to the south of the lake; the mountains to the east of the lake did not appear to be quite so high. Looking north, the Pundit had a clear view over the Brahmaputra; but all the mountains in that direction were, comparatively speaking, low, and in no way remarkable.

About Lhasa no very high mountains were seen, and those visible appeared to be all about the same altitude. Hardly any snow was visible from the city, even in winter.

Extracts from the Pundit's Diary.

"Jan. 26th, 1866.—Reached Lhasá. It was my wish now to follow the course of the Brahmaputra River, but I was informed that unless I went with a well-armed party of at least a dozen, it would be dangerous to proceed.

"The city of Lhasá is circular, with a circumference of $2\frac{1}{2}$ miles. In the centre of the city stands a very large temple, called by three different names. The idols in it are richly inlaid with gold and precious stones.

"The city stands in a tolerably level plain, surrounded by mountains, the level or open ground extending about 6 miles on the east, 7 on the west, 4 on the south, and 3 on the north. I accompanied the Ladák merchant, called Lopchak, on the 7th of February, to pay homage to the Gewáring-bo-che (the Great Lámá of Tibet), in the fort, ascending by the southern steps. A priest came out to receive us, and we were conducted into the presence of the Gewáring-bo-che, a fair and handsome boy of about thirteen years, seated on a throne six feet high, attended by two of the highest priests, each holding a bundle of peacock feathers. To the right of this boy, and seated on a throne three feet high, was the rajah Gyálbo-Khuro-Gyágo, his minister. Numbers of priests in reverential attitudes were standing at a respectful distance from them. We were ordered to be seated, and after making offerings of silks, sweets, and money, the Lámá Gúrú put us three questions, placing his hand on each of our heads: 'Is your king well?' 'Does your country prosper?' 'Are you in good health?' We were then served with tea, which some drank, and others poured on their heads, and after having a strip of silk, with a knot in it, placed by the priests round each of our necks, we were dismissed, but many were invited to inspect

the curiosities that were to be seen in the fort. The walls and ceilings of all the chief houses in the fort, and all the temples that contained images in gold, were covered with rich silks.

“The Lámá Gûrû is the chief of all Tibet, but he does not interfere with state business. He is looked upon as the guardian divinity, and is supposed never to die, but transmigrates into any body he pleases. The dead body from which the Lámá Gûrû's soul has departed is placed in a gold coffin studded with the finest gems, and kept in the temple with the greatest care. The belief of the people is that the soul of one Lámá Gûrû is privileged to transmigrate thirteen times. The present Lámá Gûrû is now in his thirteenth transmigration. Churtans are placed over the coffins containing the Lámás' bodies, and it is said that these dead bodies diminish in size, while the hair and nails grow.

“The rajah, or gyalbo, is next to the Lámá Gûrû in rank; below him there are four ministers, called kaskak, who conduct all state business, under his orders. The Chinese vakeel at Lhasá, who is called ambán, has the power of reporting against either the rajah or the four ministers to the king of China, and, if necessary, can have them removed from office.

“The general belief of all the Tibetans is, that no sooner is the Lámá Gûrû born, than he speaks, and all withered plants and trees about his birthplace at once begin to bear green leaves. The moment news gets to the Lhasá court of such an occurrence, then the four ministers repair to the house, in order to ascertain the truth by the following method:—Articles of all descriptions are placed before the child, and he is requested to tell which belonged to the late Lámá Gûrû, and which did not. Should he be able to select from the articles put before him such of those that belonged to the Lámá Gûrû, then he is pronounced to be no impostor, and is forthwith carried away to the fort of Potoláh, and placed upon the throne as Lámá Gûrû.

“The Mahomedans of Lhasá gave me the following account as to the selection of the future Lámá Gûrû:—From the day of the death of a Lámá Gûrû all male births are recorded by the Lámás about the city, and the ministers are secretly informed of them. Names are given to the children, and on the thirtieth day after the decease of a Lámá Gûrû, slips of paper, each bearing the name of a child born within the month, are placed in a vessel; the chief of the four ministers then draws out one of the slips with a pair of pincers, and whichever child's name that bears, he is pronounced to be the future Lámá Gûrû. He is then taught all that is required of him by the priests, and when they think he has come to years

of discretion, the previously-narrated ceremony of the choosing of articles is conducted. The people of Lhásá are kept in the dark as to this method of adopting a Lámá Gûrû. The Lhásá people are, by strangers, supposed to adopt a Lámá Gûrû, in order to prevent the government of the country from falling entirely into the hands of the Chinese.

“ I observed that there was but little order and justice to be seen in Lhásá.

“ The new year of this people commences with the new moon appearing on or about the 15th of February; they call it Lohsar. On New Year's Eve an order from the court goes round to have every house in the city cleaned; the houses are swept and white-washed, and the streets are cleaned. On the day following, each household displays as many flags, &c., from the house-top as it can afford. Throughout the day and night singing, dancing, and drinking are kept up. On the second day of their new year all the people of the city assemble before the Potoláh fort, to witness the following feat, performed generally by two men :—A strong rope is fastened from the fort walls to strong rivets in the ground, 100 yards distant from the base of the fort. The two unfortunate men then have to slide down this rope, which very often proves fatal to them; should they, however, survive, they are rewarded by the court. The Lámá Gûrû is always a witness of the performance from the fort.

“ From the commencement of the new year, whoever pays the highest sum is considered the judge of the rajah's court, and for twenty-three days he exercises his authority in the most arbitrary manner possible, for his own benefit, as all fines, &c., are his by the purchase. The purchaser of such authority must be one of the 7700 priests attached to the Debang monastery; the successful priest is called Jalno, and announces the fact through the streets of Lhásá in person, bearing a silver stick.

“ The priests attached to all the temples and monasteries in the neighbourhood assemble in the fort, and offer homage. This assembling of the priests is called Molam Chambo, and the holidays go by the same name. The Jalno's men are now seen to go about the streets and places, in order to discover any conduct in the inhabitants that may be found fault with. Every house is taxed in Lhásá at this period, and the slightest fault is punished with the greatest severity by fines. The severity of the Jalno drives all the working classes out of the city, till the twenty-three days are over. The profit gained by the Jalno is about ten times the purchase-money. During the twenty-three days all the priests of the neighbourhood

congregate at the Máchindránáth temple, and perform religious ceremonies. On the fifteenth day of the new year all the priests, assembling about Máchindránáth temple, display hundreds of idols in form of men, animals, trees, &c., and throughout the night burn torches, which illuminate the city to a great distance. The day on which the authority of the Jalno ceases, the rajah's troops parade through the streets, and proclaim that the power of the rajah has again been assumed by him. Twenty-four days after the Jalno ceases to have authority, he again assumes it, and acts in the same arbitrary manner as on the first occasion, for ten days, after which authority is once more assumed by the rajah. These ten days are called Chokchut Molam.

"On the first day the Lámás all assemble, as before, at Máchindránáth temple, and after a religious ceremony, invoke the assistance of their deities, to prevent sickness, &c., among the people, and, as a peace-offering, sacrifice one man. This man is not killed purposely, but the ceremony he undergoes often proves fatal. Grain is thrown against his head, and his face is painted half white, half black.

"On the tenth day of this vacation, all the troops quartered at Lhasá march to the temple, and form line before it. The victim, who has his face painted, is then brought forth from the temple, and receives small donations from all the populace assembled. He then throws the dice with the Jalno, and if the latter loses, it is said to forebode great evil, and if not, and the Jalno wins, then it is believed that the victim, who is to bear the sins of all the inhabitants of Lhasá, has been permitted by the gods to do so. He is then marched to the walls of the city, followed by the whole populace, and troops hooting and shouting, and discharging volleys after him. When he is driven outside the city, then people return, and the victim is carried to the Sáme monastery. Should he die shortly after this, the people say it is an auspicious sign, and if not, he is kept a prisoner at Sáme monastery for the term of a whole year, after which he is released, and is allowed to return to Lhasá.

"The day following the banishment of the man to Sáme, all the state jewels, gold and silver plate, &c., are brought out from the fort, and carried through the streets of Lhasá, protected by the troops armed, and followed by thousands of spectators. Towards evening everything is taken back to the fort, and kept as before. The day following, immense images of the gods (formed of variegated paper, on wooden frame-work) are dragged by men through the city, protected by armed troops. About noon the whole populace, great and small, assemble on the plain north of the city, and publicly carouse, race, and practise with the gun at targets. I was informed that

the Molam Chambo and Chokchut Molam vacations, with all the religious ceremonies and observances, were instituted from time immemorial, but that the business of putting to the highest bid the powers of sole and chief magistrate, dates from the tenth transmigration of the soul of the present Lámá Gûrû.

“One crop only is raised here in the year. Seed is sown in April, and the crop is cut in September. There is no jungle hereabouts, and excepting one thorny bush, called Sia, the hills are absolutely barren.

“A very few of the rich men’s houses are built of brick and stone, all others are of mud. Some few are built of sun-dried bricks. The manufactures of Lhásá are woollen cloths, felt, &c.

“The water supply of Lhásá is from wells, and a tax of two annas on every house is imposed monthly on the inhabitants for the use of the wells.

“During the month of December, merchants from all parts bring their merchandise here (from China, Tartary, Darchando, Chando, Khan, Tawang, Bhotan, Sikkim, Nepal, Darjiling, Azimabad and Ladák). From China, silks of all varieties, carpets and Chinaware. From Jiling, in Tartary, is brought gold-lace, silks, precious gems, carpets of a superior manufacture, horse-saddles, and a very large kind of Dumba sheep, also valuable horses. From Darchando immense quantities of tea—(Darchando is said to be situated north-east of Lhásá, and to be distant two months’ journey). From Chando city, in the Kham territory, an enormous quantity of the musk perfume is brought, which eventually finds its way to Europe, through Nepal. Rice, and other grain that is foreign to Lhásá, is brought from Tawang, in Bhotan. From Sikkim, rice and tobacco; and from Nepal, Darjiling, and Azimabad, broad-cloth, silks, satins, saddles, precious stones, coral, pearls, sugar, spices, and a variety of Indian commodities. Charas and saffron (késar) come from Ladák and Kashmir. The merchants who come here in December, leave in March, before the setting in of the rains renders the rivers impassable. The inhabitants use ornaments of coral, pearls, and precious stones, and occasionally of gold and silver, which are more especially worn by women on their heads. Coats lined with the skins of sheep are generally worn.

“During the month of December, at nights and early in the mornings, the mercury in the thermometer sank below 32°, and during the days never rose over 40° to 45°. The River Kichu was frozen at that time of the year, and water kept in the warmest parts of a house, froze and burst the vessels holding it.

“The chief divinity worshipped is that of Budh.

“The food of the inhabitants consists chiefly of salted butter,

tea, mutton, beef, pork, and fowls. Rice is not much eaten, owing to its high price, and because it is considered a fruitful source of disease. Other edibles, such as wheat, barley, and kitchen produce, &c., are cheap.

"To the north-east of Lhásá, distant about one month's journey, there is a country called Kham or Nyahrong. Thousands of the inhabitants of this country annually pay Lhásá a visit, some under the plea of wishing to worship, while others come with the ostensible reason of trading, but all really come with the object of robbing and stealing whatever they can. These people are held in terror by all the peaceable inhabitants of the Lhásá territory, who have named them Golok Khamba. Highway robbery and murder are perpetrated by them without compunction. They appear to be exempt from the wrath or punishment of the Lhásá chiefs. The Lhásá Government never takes notice of any complaints brought against this marauding tribe, and the reason I heard for this silence was that the Lhásá vakeel with government merchandise, on his annual journey to Peking, has to pass through the territory appertaining to this tribe, and to insure a safe journey for these, the Government connives at the mischief done by them in the Lhásá territory. Another reason I heard was, that in case of a war, this Khamba tribe would render good service.

"North of Lhásá, and four miles distant, is situated a long hill, stretching from east to west, reported to contain immense quantities of silver; but a government order prohibits anyone from working the metal. The Government itself refuses to work the metal; for the general belief is, that the country will be impoverished, and the men will degenerate, should the metal be worked.

"Regarding the disposal of their dead, the Lhásá people of the poorer classes bind the corpses tightly with ropes, and place them erect against the inner walls of their houses for two or three days, while the richer and well-to-do classes detain the corpses in their houses for a length of fourteen days: after which time priests are invited, who pretend to read from their ritual the manner in which these corpses are destined to be disposed. Sometimes their decision is to cut the corpse into pieces, and scatter the fragments to the birds and beasts of prey, and sometimes to bury them. The reason assigned by them for detaining the bodies springs from the belief that they may become demons if disposed of without the blessings of the priests."

The Paper will be printed entire in the 'Journal,' vol. xxxviii.

The PRESIDENT said that the communication was, doubtless, one of great importance to geographers; for although they had all from their boyhood

known something of the great country of Tibet, and it had been visited at intervals by Europeans during the last two or three centuries, yet no account of its real geographical features, or of the exact position or altitude of any place, had ever been brought before the Society prior to the present journey of the Pundit. Missionaries reached the country in the 17th century, but no astronomical observations were made as to the position of places. In the time of Warren Hastings's presidency over our Indian Empire an expedition reached Tibet, but it brought back no observations for the accurate determination of positions. Even in so recent a time as Lord Canning's government in India, that excellent administrator determined upon an expedition into this region, but it was never carried into effect. It had been an opprobrium to Englishmen, that though this interesting region lay at no very great distance beyond the Himalaya Mountains, which had been admirably explored by English surveyors, they had never yet reached Tibet. The difficulties of penetrating the country had been forcibly described by Captain Montgomerie, without whose admirable and ingenious contrivance of instructing an intelligent native, and sending him in disguise, the Society would never have had this account of the country brought before them. The latitude of Lhasa had now been accurately determined, and this was one of the many geographical results of the exploration. Dr. Thomson, who had received a medal from the Society for his adventurous explorations in Ladak and the Karakorum Pass, and Dr. Campbell, the companion of Hooker, who had, from great elevations in Sikkim, looked over into the great region of Tibet, would be able to offer some important observations on the subject of the paper. Lord Strangford and Sir Henry Rawlinson, Asiatic scholars, who had studied the subject for a long time, would afterwards make some observations which would throw light not only upon this particular region, but upon the course of the great Brahmaputra River which flowed through the central portion of the country. Although that river was at so short a distance from the north of our Indian possessions, its course in passing through the Himalayan chain into Assam was not yet defined. This was one of the great geographical problems which remained to be solved.

DR. THOMSON said that he could add very little to the excellent remarks made by the President, who had appreciated the paper in a manner which must be most gratifying to all Himalayan travellers. He regarded with a feeling almost of envy the success of the Pundit in exploring a region from which Englishmen had, unfortunately, been debarred by the jealousy of the Chinese Government. English travellers had not been prevented from penetrating into Chinese Tibet by a want of enterprise, but entirely by the anxious desire of the Chinese Government to keep them out. For a long time the whole Himalayan chain, from Cashmere on the westward to Bhotan on the eastward, was independent of the British Government. It was only since the beginning of the present century that certain parts of it had become British territory; and even now Nepal, which constituted nearly half of the whole extent of the chain, was, as much as Chinese Tibet, forbidden ground to English travellers,—Englishmen not being allowed to travel farther than the capital, Kathmandu; and it was only persons belonging to the embassy and one or two privileged persons who might be allowed to accompany it. Travellers had, however, been “nibbling” at Tibet in all directions; and, fortunately, about the year 1784—before the jealousy of the Chinese Government had been excited by the increasing power of the English Government in Hindustan—two official Englishmen were permitted to cross the Himalayan chain from Bhotan and to penetrate into Tibet as far as Shigatze and Gyanze. The observations made by them were the only careful explorations of Tibet Proper on record until the present account was given by the Pundit. Two distinguished travellers had, however, succeeded in penetrating a few

miles into the southern portion of the country. These were Dr. Hooker, whose journey through Sikkim was so difficult and at the same time so successful, and Dr. Campbell, who accompanied him. These gentlemen were able, from the high elevation of Donkia and the mountains immediately to the north, to look over the whole of the enormous and comparatively flat country of the valley of the Brahmaputra; and as nearly as they could, without knowing the absolute distance, they measured the elevation of the immense mountains which lay to the north of the river, and now again seen by the Pundit. The President had commented on most of the points of interest in the paper. The curious lake Yamdokcho was still a vexed question; for as the Pundit had travelled only along one side of it, he had, as Captain Montgomerie well remarked in the paper, not satisfied us of the nature of the island which was said to occupy nearly its whole area. There was another lake marked to the westward, but about which there was also some doubt. It was evidently put down from native observations.

DR. CAMPBELL expressed his admiration of the extraordinary courage, perseverance, and zeal of the Pundit traveller. When he (Dr. Campbell) entered Tibet he was nearly murdered, having been seized, beaten, and imprisoned by order of the Sikkim chiefs, who had political objects of their own; but the officials who carried these intentions into effect had used violence with the desire of propitiating the Chinese authorities at Lhasa, with whom they were always intriguing. He travelled with Dr. Hooker over a pass, the elevation of which was 18,500 feet, and went twenty miles beyond into the interior of Tibet. The country was perfectly bare and nearly level. They ascended the hill called Bhomtso, and from that elevation they could distinctly see the beautiful mountain of Chomalari to the east, which was described by Turner, who penetrated as far as Shigatze. To the north and west they could see a very high range of mountains, which he believed had never before been noticed; but their observations on this subject were recorded in Dr. Hooker's journal. The Pundit said that this elevated range ran for 120 miles parallel to his route. Dr. Hooker, from the elevation on which he stood (at 18,500 feet), estimated it to be at least 24,000 feet. It must be gratifying to Dr. Hooker now to find the Pundit had confirmed his conjectural geography. There was one point in the Pundit's account which was of great scientific interest, but still rather obscure. He stated that on approaching the Yamdokcho Lake he was informed the island which it contained occupied nearly the whole area of the lake, and he put it down at 16,000 feet high, giving the elevation of the lake itself at 13,000 feet above the level of the sea. The diameter of the island he stated to be two miles. He (Dr. Campbell) did not know what angle would be formed by a peak rising 3000 on a base of two miles diameter; but the information which he had obtained from native travellers at Darjeeling—hundreds of whom he had questioned—did not quite correspond with the statement of the Pundit. The island, according to them, did not fill the whole lake, only a corner of it. The island was frequently visited by pilgrims and others. Travellers also asserted that the water of the lake was brackish and dangerous to drink, but the Pundit maintained that it was sweet and good. In reference to the description of the election of the Grand Lama, it was scarcely credible that such an event should be so simply determined as by the throwing of the names of children into a hat, and the drawing of one name. He had known the office in less important monasteries than Lhasa to be vacant for years, in consequence of the whole body of Lamas being unable, through motives of self-interest or policy, to arrive at a decision.

LORD STRANGFORD said that Dr. Campbell had anticipated the chief portion of what he had to say. He had been for some time acquainted with the excellent paper which Dr. Campbell had written in the *Journal of the Asiatic Society of Bengal*, which gave an account of the country between Lhasa and

Bhotan. Dr. Campbell had not visited the country himself, but his account of it was one of the best instances which he (Lord Strangford) knew of rigorously critical exposition of merely hearsay information. It gave a most accurate delineation of the country, as was shown by the map annexed to the paper—the lake, however, being represented without that island girt with the ring now fully verified by the Pundit. The general impression of Tibet was that of a country ending two or three degrees eastward of Lhasa, and differing in its physical features from the country to the east: its table-land being there broken up by a succession of rivers and mountain ranges running north and south. There was no longer a system of plateaux and valleys bounded by low mountain ranges rising from an enormously high level; but, so far as was known, there were precipitous and frightful mountain ranges in a parallel series bounding the upper streams of great rivers flowing into China, or due south into Cambodia, or the Brahmaputra. This general impression is more or less correct as regards the physical geography of that country; ethnologically, however, or rather socially and politically, the whole of the country lying to the westward of China might more properly be divided by a line from east to west than one from north to south. The entire north of that line was Tibetan in language, but was inhabited by wild tribes and robbers; while the south was in just the same category as Tibet Proper, and its social condition was precisely analogous to that of the Lhasa country. The capital of this country is called Tsiampo, corresponding to the Pundit's name of Chando, and its distance from Lhasa, given by him as a month's journey, corresponds with the thirty-five days' journey assigned it by the Chinese and Nepaulese itineraries. The province is called Kham, and it falls into the two divisions of settled and nomadic in just the same way as the province of U, or Tibet Proper, of which Lhasa is the capital. He had thought a great deal over the place mentioned as Jiling, without being able to identify it, and he could only suppose that the articles of trade mentioned in connection with it indicated that it belonged to a civilised country. He could not understand anything about that place, unless it were some part of China Proper,* the only country in the neighbourhood capable of manufacturing articles such as described.

In explanation of these statements he would refer to what had been before communicated to the world on this subject. The first authority was a Chinese work which appeared to have been written about the year 1780, and purported to be a detailed description of Tibet. It was translated into Russ by the Archimandrite Hyacinth. It had never appeared in an English form; but it had been translated into French by the celebrated traveller Klaproth, and had been printed in the French 'Journal Asiatique.' It had formed the pocket companion of the missionaries when they retraced the southern road; and they stated that they found it accurate. Their text would give the reader to understand that they travelled with the Chinese original in hand, which had been presented to them on their journey; and no doubt they did; but entire passages which they quote are given *verbatim* in Klaproth's words, as translated in the 'Journal Asiatique.' It was thus adopted and vouched for by Huc and Gabet, but then there arose the question, "Who will vouch for Huc and Gabet?" The necessary link was supplied by Mr. Bryan Hodgson, who was for some time resident in Kathmandu, in a most valuable contribution to the 'Journal of the Bengal Asiatic Society.' His paper was given him by the Maharajah of Nepaul as a keepsake, the donor knowing that it would be more appreciated

* Dr. Campbell suggested to the speaker that there was a Chinese town, called Tchiling-foo, on the north-western frontier of that country. In this case Jiling, or Tchiling, could hardly be other than the city of Sininfoo, close to the Koko Nor, on the Himalayan frontier—the north-eastern entrance of China from Tibet, as the city of Tachindo is the due eastern.

by a man of science than any more material gift. It was an account of two embassies between Peking and Kathmandu. It was a dry enumeration of the stages, the names of places, stations, bridges, fords, and mountains, and gave in a general way the features of the country. He (Lord Strangford) had gone through this paper and compared it throughout with the Chinese document translated in the '*Journal Asiatique*,' and he found that the bulk of the names of the places described in the two papers were virtually identical. This was the more wonderful because the names were transcribed, on the one hand, from Chinese, which was a very difficult language for the expression of proper names, and, on the other hand, from Nepalese. Huc and Gabet took thirty-five days on their journey to Chando in Kham, for example, while the Embassy route specified thirty-six stages; the various points being as regularly laid down as the stations of the North-Western Railway. The Chinese terminus of this road, so utterly unknown and unfixed as it is when taken as a whole, yet so minutely specified in its details, is the city called by the Embassy Tachindo, by the Chinese itinerary Ta-tsien-leu, and evidently the Pundit's Darchando. His Darchando is clearly this western frontier town of China, where there is a custom-house for arrivals from Tibet, and a fair held once a year as a tea-mart. Huc and Gabet described an iron bridge which was crossed at a certain time of the year. During the other portion of the year boats were used. In all these details there was a sort of omnilateral verification, and they constitute a very curious case of coincident information. The name of Golok Khamba, which was given to the robbers, was identical with the name which Huc and Gabet gave to the robbers on the north-east road. These robbers were called Kolo by Huc and Gabet, and were described as a most formidable impediment to trade. Khamba means people of Kham, the province due north of which would be the haunt of these robbers, who appear to infest the whole of these countries everywhere, if it be the case, as the Pundit says, that they flock to Lhasa in thousands in disguise as worshippers, and steal right and left. The Pundit's Nyahrong is the name of a tribe which was placed in exactly the same locality by Mr. Bryan Hodgson under the name of Gyarung. Hodgson was fortunate enough to meet with some natives of those inaccessible regions in Nepal, where he measured the men from top to toe, and chronicled the colour of their hair and eyes and other features. He also took down their language, and compiled a very full grammar of it. The names by which the Tibetans knew the neighbouring countries, as yet impervious to us, helped to illustrate the ethnology of those countries. The Turks were there known by the name of Hor-pa, and the Mongolians by that of Sok-pa. The extent of the Mongolian settlements was known by the prevalence of the names significant in their language. Huc and Gabet mentioned that they crossed what he thought might be the Eastern analogue of the great Pamir plateau on the west, which appeared, when seen from the south, to be a high snowy range; but only after travelling about ten or twelve days were they able to clear it. They thus described it as a plateau rather than a range, and also as being, in their belief, the highest level ground on the earth. That opinion was also expressed by many other authorities. He (Lord Strangford) highly appreciated the praiseworthy sagacity and energy of Captain Montgomerie in conceiving and carrying out such a brilliant scheme as the special education of natives for the purpose of visiting countries which were inaccessible to Europeans; and he congratulated the Society upon the splendid and fruitful harvest of scientific result which had been yielded at the first sowing of the good seed.

Sir HENRY RAWLINSON said he re-echoed the tribute of gratitude and admiration which Lord Strangford had expressed as due to Capt. Montgomerie. The value of native assistance was recognised from a very early period of our Indian empire; and native agency in the East had been employed from the time of Sir John Malcolm and Mr. Elphinstone for the purpose of acquiring

political and statistical information. It was, however, reserved for Capt. Montgomerie to utilise the native element in another direction. It was he who first appreciated the capacity of the natives as scientific observers, and discovered that they could use a sextant and a theodolite as well as Europeans. That was really a most valuable discovery, which would enable geographers to make great advances in knowledge, by placing at their disposal surveyors who could be employed along our whole northern frontier in the solution of otherwise insoluble problems. There were in the paper a few points which he thought it desirable to explain popularly to the meeting. In the first place, he was constantly asked, "What is a pundit?" A pundit was not a very mysterious personage. The word simply meant one who had read the "shasters" or sacred books of the Hindoos. A pundit was simply then an educated Hindoo. He would be very valuable for the Buddhist countries, but he would be utterly useless in Mahommedan countries. When Capt. Montgomerie had to explore Mahommedan countries he very properly made use of a Mahommedan assistant in his survey. Last year the Society had from Capt. Montgomerie a very valuable communication, showing how by the aid of a Mussulman attached to the survey he had been able to connect Yarkand with the trigonometrical survey. At present all that had been done—and this was a very great step in advance—had been to survey the immediate line beyond our northern frontier; but in process of time they would extend their explorations and survey an outer line. The only considerable part of Asia which was now unknown, and which was unknown not only to the English and to the Russians, but even to the Chinese, was the country intervening in a direct line between Khotan and Lhasa. He hoped that the exploration of that country was reserved for English enterprise, or native enterprise directed by English intelligence. There was also another very interesting problem which must be solved sooner or later, and the sooner the better, namely, the course of the River Brahmaputra. It had been followed down carefully from its source in the Mansarowar Lake to Lhasa; but the part below Lhasa, where it turned to the south and descended through the mountain range to the plains of India, was still a mystery. It had never been visited. The Pundit would have attempted the journey if he had had a proper supply of money; but for want of funds he was unable to obtain an escort, and without that it would have been quite impossible to perform the journey. The route of the Pundit was not an absolutely new line, that is he was not the first traveller who had passed from Ladak to Lhasa. The line was partly travelled indeed by Andrada in the seventeenth century, and it was completely followed from one end to the other by Father Desideri in A.D. 1715; but the accounts of those travellers were sadly wanting in geographical interest. The most important feature, for instance, in Desideri's account was his description of the way in which he crossed the rivers, by holding on to a cow's tail. Having nothing else to commemorate, he filled pages of his narrative in insisting on the absolute necessity of cows to enable travellers to cross the rivers. Such was the style of geographical record and description with which the Jesuit accounts teemed. It was different with the English officers who were sent to Tibet by Warren Hastings. Mr. Bogle unfortunately died before he could publish the narrative of his journey; but his assistant, Mr. Stuart, communicated some details; and Major Turner, who led a subsequent mission to Tibet, had left a very valuable record of his observations, which were of the greatest importance both to geography and science. He (Sir Henry Rawlinson) had sometimes heard such explorations as those of the Pundit characterised as a useless and unjustifiable risk of life for the mere gratification of curiosity. He protested against any such doctrine; he maintained that the geographical discovery which was encouraged by the Society was not a mere dilettante object, or one pursued merely for the purpose of producing a sensation at the Geographical Society.

On the contrary, they encouraged explorations in Central Asia or Central Africa for a tangible purpose. Geographical discovery led to the spread of civilisation and general intelligence, and even to material advantage in the advancement of commerce and trade. He thus honestly believed that the Pundit's travels in Tibet had paved the way for the extension of our trade in that direction, and might hereafter prove of very great importance. There was, indeed, at the present time before the Geographical Society a paper by Mr. Forsyth, which pointed out the immense value of the countries beyond where the Pundit had been travelling in regard to the export and import trade of India. All that part of Asia formerly belonged to China, and was subjected to the same rigorous exclusiveness which was now practised in Tibet; but during the last three or four years Turkestan had become independent, and the intercourse with China was cut off. Now in that country they were desperate tea-drinkers, and drank that beverage morning, noon, and night; but since their rupture with China they were at their wit's end how to procure their tea. At the present time, indeed, tea grown in China, and intended for the country of which he was speaking, was first taken down to the coast, then round India to Bombay; thence it went to Kurrachee; thence up the Punjab to Lahore; from Lahore it passed to Bokhara; from Bokhara it went on to Kashgar; and in that way only did it arrive at its destination. Now if Tibet and the neighbouring countries were thoroughly explored and civilised the tea might penetrate from India, if not from China, into Turkestan, by a hundred different channels. In return for the tea again there might be exported the *Turfan* wool which was produced in that country. It was the finest wool in the world, and was far better fitted than the produce of Tibet for the looms that wove the Cashmere shawls. It was almost impossible now to get the genuine wool in India, and consequently the weavers of the Punjab diluted their wool with a Persian material from Kerman, which was much inferior, and the Cashmere shawls had in consequence greatly deteriorated in quality. Under the auspices of British geographers both trades might be improved. We might be able to supply the Turkestanis with tea, and they might be able to supply us in exchange with Turfan wool. He mentioned this case to show that there were practical advantages attending geographical exploration, and that it was not pursued in a mere dilettante spirit or for a mere visionary object. It would in reality prove of very great value in improving the social state of the East. The Pundit had further remarked upon the long stages of the road between Ladak and Lhasa, and had stated that the Tibetans kept up a very regular and rapid communication. It appeared, however, that they took 35 days to travel 800 miles, a rate of progress which any Eastern traveller who had been accustomed to ride post in Turkey and Persia would regard as perfectly childish. The regular Tartar rate of travelling was 100 miles a day, and this rate was kept up for fourteen or fifteen days in succession if necessary. Sir Henry had himself on several occasions ridden "Tartar" between Baghdad and Samson, and between Teheran and Meshed at this rate, and there was on record an instance of a famous Turkish courier, named Mustafá, having ridden from Constantinople to Demawend, beyond Teheran, a distance of 1700 miles in fourteen days, bringing to Sir Henry Willock the intelligence of Napoleon's escape from Elba. In these journeys the courier is never allowed to take any regular sleep, though he dozes sometimes on horseback. As to the use of the "prayer-wheel," he might explain that the prayer to be offered was pasted inside the wheel, so that turning round the wheel was equivalent to saying the prayer, and in this way an entire service might be got through in five minutes. The practice was an illustration of the ordinary tendency of the Tibetans to avoid trouble as far as possible.

MR. CRAWFORD said that he agreed entirely with the eulogium which had

been passed upon the Pundit, and more particularly with that upon Captain Montgomerie, who educated him for the work. A pundit meant simply a learned man. But he must be a Brahmin. He (Mr. Crawford) had read that morning an account, written by a pundit, of the greatest native battle ever fought in India, that of Paniput. He strongly recommended its perusal. It was to be found in vol. iii. of the 'Transactions of the Asiatic Society of Bengal.' He was at a loss to understand where the commerce of Tibet was to be found. The country was a very poor and very sterile one. The only valuable thing which it produced was a shawl-wool, and of this the Brahmin took no notice. The wool which Sir Henry Rawlinson had mentioned as being of an excellent quality was only goat's hair. Their tea had been mentioned as being produced somewhere in Tartary. It was Chinese and horrible trash, and would produce a wash that would turn the stomach of a hog. He did not consider that the route which was described by Sir Henry for the transport of tea would be superior to the existing one.

MR. T. SAUNDERS stated that there was now no difficulty in obtaining the consent of the Chinese Government for any European to pass the British frontier into Tibet. He gave that information on the authority of Mr. Consul Morrison, who was thoroughly familiar with Chinese matters, and who had assured him that the restrictions existing on the Chinese frontier were only such as would exist on any frontier where passports were demanded. Passports might be readily obtained at Peking simply for asking. That fact was important, as it might spare the Pundit the necessity of risking his life in future explorations.* The latitude ascribed to Lhasa by the Pundit cor-

* The following memorandum on this subject has been communicated to the Secretary by Mr. Morrison:—"It is to be regretted that the Topographical Department in India, under a mistaken supposition that the Chinese Government dislike foreigners to travel in their country, have thought it necessary to send agents across the Chinese frontier to make surveys in a clandestine manner, instead of openly. . . . Travelling in China and Tartary is now perfectly easy and safe for British subjects provided with passports, and in their proper characters; but the want of passports must generally cause the detention of travellers, while the assumption of false characters (especially on the part of surveyors) must tend to excite suspicions in the minds of the Chinese, injurious to the friendly and confidential relations which have now subsisted for seven years between the British and the Chinese Governments.

"Since 1861 many British subjects, Americans, Frenchmen, Germans and Russians, have every year travelled over a large extent of eastern and central China and Tartary without meeting the slightest hindrance or molestation.

"The friendly disposition towards foreigners, equally of Chinese, Tartars, and Tibetans, is abundantly described in the books of Turner, Huc, Fortune, and others.

"Although persons may travel safely in China or Tartary without knowing the language of the country, the knowledge of at least a few words would be useful to enable travellers to dispel groundless fears, which sometimes are a cause of difficulty. This was exemplified in the case of Mr. Bickmore, whose paper was lately read before the Geographical Society.

"The stoppage at the frontier of travellers without passports need not be considered to indicate hostility to foreigners. It is done simply in compliance with municipal regulations, which are enforced more strictly against Chinese themselves than against foreigners. The restrictions on Europeans have been imposed, not by the Chinese, but by their own governments, in the interest of order, and to prevent a trade of very great value being jeopardised by the misconduct of evil-disposed persons.

"That the Chinese Government does not entertain towards foreigners the jealousy often ascribed to it, is proved by its readiness to employ foreigners in positions of trust, and where scientific qualifications are demanded. The present chief of the Chinese Maritime Customs is a British subject, having under him a staff of

responded within three minutes of that reported by Williams. The course of the great Sampu River in the maps by D'Anville and the Jesuit missionaries, was well confirmed by the labours of the Pundit.

The PRESIDENT, in concluding the Meeting, stated that he could not more appropriately close the proceedings than by reading portions of a letter which he had received a few days ago from Captain Montgomerie. He wrote as follows :—

“MY DEAR SIR RODERICK,

“Camp, Jugboorn, 29th Jan., 1868.

“I hope, by the time this reaches London, you will have received a copy of my Report on Trans-Himalayan Explorations, which Colonel Walker promised to send to you when ready.

“The explorations have been made on the plan which I initiated a few years ago, and of which I gave you the first results in the expedition by which the position and height of Yarkund were determined. The fruits of the present expedition are, I think, an improvement on those of the last, as they embrace a much larger tract of country.

“I hope the route surveyed will form a fairly accurate basis for the whole of Tibet, or of Great Tibet, as it is generally applied to the Lhasa territories.

“I wish I could present the Pundit to you in person. I am sure he would make a good impression anywhere, and I can quite understand his being an immense favourite with the Ladakis who convoyed him into the Sacred City. Without their assistance he would have found it a very much more difficult matter than he did, though it was difficult enough in every way. The Pundit, I think, deserves all praise; his work has stood every test capably. The latitude observations are undeniably good, and in that respect the position of Lhasa is well within half a minute of the correct value. The longitude may be said to be true within about a quarter of a degree, and the height, 11,700 feet, some 200 or 300 feet probably in defect. Considering the great distance traversed, the longitude could hardly be much closer. The height has never been determined before; the latitude, even in Mr. Keith Johnston's last atlas, was given about one degree and a half in excess, if I remember right; while the longitude derived from the side of British India was nearer the mark.

“The old maps of Great Tibet give a great deal of detail, and they were supposed to be relatively correct in longitude, and to be tolerably correct in latitude. The Pundit's work, however, shows that this view was incorrect, and the old maps are not even tolerably correct in latitude. Some geographers had come to this conclusion a good many years ago, as they found that they could not reconcile the positions of Shigatze and Lhasa, as derived from Turner, with the positions assigned to those places in the old maps. The consequence was they omitted all details north of the Himalayas. This was going to the other extreme: for, judging by the Pundit's work, we may conclude that the old maps do, in a general sort of way, represent the large features,

several hundreds of Europeans. The arsenal at Nanking and the dockyard at Foochow are respectively under British and French officers. One hundred and fifty years ago the great survey of the empire (an admirable one for the period) was made for the Chinese Government by European (chiefly French) mathematicians, who were allowed to send copies of it freely to Europe.

“It cannot be doubted that the Chinese Government would now be perfectly willing, if the proceeding were suggested to them, to undertake conjointly with the British Government an exploration to discover practicable routes between the Chinese territories and British India. They would no more object to an overland traffic by such routes than they have ever done to the traffic with Russia through Mongolia, or to that with Corea, Cochinchina, and Burmah.—*M. C. Morrison, March 23.*”

though the accuracy, even relatively, is very small. The old maps, in fact, appear to have been compiled from eye-sketches supplied by the Lamas, and put together by other people as they received them, without any means of supplying accuracy. I should very much doubt if there was any attempt to determine the latitudes by the Lamas, and, as far as is known, no observations were taken in Tibet by any of the Jesuit missionaries; the said missionaries did, however, take the latitudes of several of the cities of Eastern Turkistan, and hence it was naturally concluded that they had done the same for Tibet.

"The shape of the Great Yamdokcho Lake was always a puzzle to me, but the Pundit saw more than half of it, and vows that it is of much the same shape as shown in old maps, viz. a narrow ring of water encircling a very large island. I am not aware of any other lake like it, and, as the Pundit did not go all the way round, it may be urged that it is doubtful; but all evidence on the subject is unanimous, or very nearly so.

"The road along the top of the Himalayas, at an average height of say 14,000 feet for 800 miles, is not a line which people would imagine commerce to be carried along; yet it is said to have been in use for centuries. The Pundit's ancestors were Budhists, and hence you can easily imagine his feelings when ushered into the Great Lama's presence, with his prayer-wheel stuffed with survey-notes and an English compass in his sleeve. Fortunately, he was not very closely examined; and, finding that his thoughts were not divined, he regained his nerve, and managed to take the dimensions of the Great Lama's residence and fort as he returned from the audience. I have given the Pundit's observations and measurements in full, so any one that wishes can examine into the merits of the work themselves.

"I have concluded my Report with a separate memorandum on the Brahmaputra River, which you may perhaps think worth discussing separately. I am trying to extend the explorations northward into the great blank between the Himalayas, Russia, and China Proper; and some day I hope to get a route carried down the great river from Lhasa to well-known parts of the world.

"Hoping the Pundit's labours may prove acceptable to the Geographical Society,

"I am yours very truly,

"T. G. MONTGOMERIE."

Tenth Meeting, April 27th, 1868.

SIR RODERICK I. MURCHISON, BART., K.C.B., PRESIDENT, in the Chair.

ELECTIONS.—*Captain W. B. Colvin; Lieutenant A. Combe; the Right Hon. Lord F. H. Kerr; Lieutenant W. S. A. Lockhart, 14th Beng. Cav.; Lieutenant Cecil W. E. Murphy, R.A.; Brigadier-General William L. Merewether, C.B.; William C. Scott, Esq.; Lieutenant-Colonel Harvey Tower; William Richard Winch, Esq.; F. T. Worsely-Benison, Esq.*

ACCESSIONS TO THE LIBRARY, MARCH 23rd to APRIL 27th, 1868.—*Tod's 'Travels in Western India,' 1839. Boisgeslin's 'Malta,' 1805. Wicquefort's 'Voyages,' 1727. Olearius's 'Voyages Célèbres,' 1727. Mendez Pinto's 'Historia Oriental,' 1627. 'Voyages of M. Pinto,' 1645. Russell's 'Aleppo,' 1794. Thevenot's 'Voyages,'*

1683. Doolittle's 'Social Life of the Chinese,' 1866. Ellis' 'Madagascar Revisited,' 1867. Knox's 'Ceylon,' 1817. Harkness' 'Neilgherry Hills.' Prinsep's 'Thibet,' 1852. Godet's 'Bermuda.' Charlevoix's 'Paraguay,' 1769. All purchased. Hughes' 'Class-book for Physical Geography,' 1868. Donor, the author. W. L. Jordan's "'Vis inertiae," and a New Theory of the Tides,' 1868. Donor, the author. Ker Porter's 'Travels in Persia,' 1820. Donor, the Rev. T. C. Thornton.

ACCESSIONS TO THE MAP-ROOM SINCE THE LAST MEETING.—Ordnance Maps, on various scales; 980 sheets. Presented by the War Office, through Sir Henry James, R.E. A valuable collection of District Maps of India, in the Bengal Presidency, &c., 55 inches. Presented by Major J. Baillie, Bengal Staff. Map of part of Abyssinia, showing the progress of the British army. Presented by the War Office, through Sir Henry James, R.E. Map of the South-Eastern part of Abyssinia, from Addigerat to Magdala; also one from Tekonda to Addigerat, showing the fortress of Magdala. Presented by Dr. A. Petermann.

The following telegram relating to the recent victory of the British army in Abyssinia was read by the President:—

"26th April, 1868.

"From the President and Council of the Berlin Gesellschaft für Erdkunde, to Sir Roderick Murchison, President of the Royal Geographical Society.

"By despatch of Colonel Beauchamp Walker we receive, on celebrating the fortieth anniversary of our foundation, the telegraphic news of Magdala being taken; and we present our congratulations to the Royal Geographical Society for this new success of British valour, benefiting geographical science."

In announcing the receipt of letters from Dr. Livingstone, which were about to be read, the PRESIDENT said that in January last, when by the return of the Livingstone Search-Expedition his prediction respecting the great traveller was verified, and it had been ascertained, through the successful labours of Mr. Young and his associates, that Livingstone had not been killed near Lake Nyassa, he was so unwell that he could only express to the Society by letter the intense joy and gratification he experienced at this result. Now, indeed, we had fresh grounds for rejoicing—now that we had in our hands letters from Livingstone himself, written four months after the time when the deceitful scoundrels of Johanna said he was killed, and 400 miles to the north of the spot where, as the lying Moosa declared, he saw him fall under the axe of a Zulu Caffre. He (the President) had already had an ample reward in receiving the thanks of the Society for having seen through the false story of the Johanna deserters which produced such wide distress, and for having unflinchingly persevered in his endeavour to induce Her Majesty's Government to send out that expedition which brought to us the joyful tidings. He felt certain that Livingstone would succeed in exploring the interior of Africa; for he knew how to calculate upon his undaunted perseverance, his iron frame, and above all upon that peculiar gift which he so eminently possesses of attaching to him, wherever he goes, the Negro as his true friend. So, therefore, when it was reported by Arab traders who reached the east coast, that a white man

had been seen to the south of the Lake Tanganyika, he felt sure that that man must be Livingstone, and now we have the proof of it in his own handwriting. After the reading of the despatches and letters, he would review the three possible routes which Livingstone might follow, and speculate upon the time which may elapse under each of these conditions, before he might, under Providence, bring his glorious labours to a happy end.

The following Letters from and Despatches relating to Dr. Livingstone were then read :—

1. *Letter to SIR RODERICK MURCHISON.*

“ MY DEAR SIR RODERICK,

“ Bamba, 2nd February, 1867.

“ This is the first opportunity I have had of sending a letter to the coast, and it is by a party of black Arab slave-traders from Bagamoyo, near Zanzibar. They had penetrated here for the first time, and came by a shorter way than we did. In my despatch to Lord Clarendon I give but a meagre geographical report, because the traders would not stay more than half a day ; but, having written that through the night, I persuaded them to give me an hour or two this morning, and if yours is fuller than his Lordship’s you will know how to manage. I mentioned to him that I could not go round the northern end of Lake Nyassa, because the Johanna men would have fled at first sight of danger ; and they did actually flee, on the mere report of the acts of the terrible Mazitu, at its southern extremity. Had I got them fairly beyond the lake, they would have stuck to me ; but so long as we had Arab slave-parties passing us they were not to be depended on, and they were such inveterate thieves it was quite a relief to get rid of them, though my following was reduced thereby to nine African boys, freed ones, from a school at Nassick, Bombay. I intended to cross at the middle of the lake, but all the Arabs (at the crossing station) fled as soon as they heard that the English were coming, and the owners of two dhows now on the lake kept them out of sight lest I should burn them as slaves. I remained at the town of Mataka, which is on the watershed between the sea-coast and the lake, and about 50 miles from the latter. There are at least a thousand houses [in the town], and Mataka is the most powerful chief in the country. I was in his district, which extends to the lake, from the middle of July to the end of September. He was anxious that some of the liberated boys should remain with him, and I tried my best to induce them, but in vain. He wished to be shown how to make use of his cattle in agriculture ; I promised to try and get some other boys, acquainted with Indian agriculture, for him. This is the best point I have seen for an influential station ; and Mataka showed some sense of right when his people went, without his knowledge, to plunder at a part of the lake,—he ordered the captives and cattle to be sent back. This was his own spontaneous act, and it took place before our arrival ; but I accidentally saw the strangers. They consisted of fifty-four women and children, about a dozen boys, and thirty head of cattle and calves. I gave him a trinket in memory of his good conduct, at which he was delighted, for it had not been without opposition that he carried out his orders, and he showed the token of my approbation in triumph.

“ Leaving the shores of the lake we endeavoured to ascend Kirk’s range, but the people below were afraid of those above, and it was only after an old friend, Katosi or Kiemasura, had turned out with his wives to carry our extra loads that we got up. It is only the edge of a plateau peopled by various tribes of Manganja, who had never been engaged in slaving ; in fact they had driven away a lot of Arab slave-traders a short time before. We used to think them all Maravi, but Katosi is the only Maravi chief we know. The *Kanthunda*, or climbers, live on the mountains that rise out of the plateau. The

Chipeta live more on the plains there; the *Echewa* still further north. We went west among a very hospitable people till we thought we were past the longitude of the *Mazitu*; we then turned north, and all but walked into the hands of a marauding party of that people. After a rather zigzag course we took up the point we had left in 1863, or say 20' west of *Chimanga's*, crossed the *Loangwa* in 12° 45' s., as it flows in the bed of an ancient lake, and after emerging out of this great hollow we ascended the plateau of *Lobisa* at the southern limit of 11° s. The hills on one part of it rise up to 6600 feet above the sea. While we were in the lowlands I could easily supply our party with meat, large game being abundant, but up on these highlands of the *Babisa* no game was to be found. The country, having become depopulated by the slaving in which the people engaged, is now a vast forest, with here and there, at wide intervals, a miserable hamlet. The grain is sown in little patches in the forest, and the people had nothing to sell. We had now a good deal of actual gnawing hunger, as day after day we trod the sloppy dripping forests, which yield some wretched wild fruits and lots of mushrooms. A woman can collect a load of half a hundredweight: after cooking they pound them into what they call porridge; but woe is me! they are good only for producing dreams of the roast beef of bygone days. They collect six kinds, and reject about ten, some as large as the crown of one's hat. When we got to the *Chambeze*, which was true to the character of the *Zambesi*, in having abundant animal life in its waters, we soon got an antelope on its banks. We crossed it in 10° 34'. It was flooded with clear water, but the lines of bushy trees which showed its actual banks were not more than forty yards apart. We arrived here (at *Bemba*) on the last day of January; it is a stockaded village with three lines of defence, the inner one having a deep dry ditch round it. I think, if I am not mistaken, that we are on the watershed we seek between the *Chambeze* and *Loapula*. I have not had any time to take observations, as it is the rainy season and almost always cloudy; but we shall rest a little here and get some flesh on our bones. We are about 10° 10' s., 31° 50' E. Altitude about 4500 feet above the sea. The *Loapula*, or *Luapula*, is said to be a very large river, but I hope to send fuller information from *Tanganyika*. I have done all the hunting myself, have enjoyed good health, and no touch of fever: but we lost all our medicine,—the sorest loss of goods I ever sustained; so I am hoping, if fever comes, to fend it off by native remedies, and trust in the watchful care of a Higher Power. The chief here seems a jolly frank person, but unless the country is insecure I don't see the use of his lines of circumvallation. He presented a cow on our arrival, and a huge elephant's tusk because I had sat on it.

"I have had no news whatever from the coast since we left it, but hope for letters and our second stock of goods (a small one) at *Ujiji*. I have been unable to send anything either; some letters I had written in hopes of meeting an Arab slave-trader, but they all 'skedaddled' as soon as they heard that the English were coming. I could not get any information as to the route followed by the Portuguese in going to *Cazembe* till we were on the *Babisa* plateau. It was then pointed out that they had gone to the westward of that which from the *Loangwa* valley seems a range of mountains. The makers of maps have placed it (the Portuguese route) much too far east. The repetition of names of rivers, which is common in this country, probably misled them. There are four *Loangwas* flowing into *Lake Nyassa*.

"Would you kindly say to Captain Richards that I had to draw some rifles and ammunition from H.M.S. *Wasp*, and I shall feel obliged if he makes that right.

"With kindest regards to Lady Murchison,

"I am, ever affectionately yours,

"DAVID LIVINGSTONE."

2. *Despatch to the EARL of CLARENDON, K.G.*

[Transmitted by LORD STANLEY, Her Majesty's Secretary of State for Foreign Affairs.]

"Bemba, lat. 10° 10' S., long. 31° 50' E.,

"February 1st, 1867.

"MY LORD,

"On our arrival yesterday at this town, we found that a party of black Arab slave-traders was ready to start for Bagamoyo, near Zanzibar, and could remain only half a day to allow of our writing. The geographical matter must therefore be short.

"We could not go round the northern end of Lake Nyassa, as we intended, partly because the country had been swept of provisions by Zulu marauders, and partly because I felt sure that the Johanna men would flee at sight of danger, as they afterwards actually did, on mere report, at its southern end. By striking southwards we passed through a depopulated tract of about one hundred miles, but became acquainted with Mataka, the most influential chief on the watershed between the coast and the lake. His town consists of at least 1000 houses, and, the altitude above the sea being over 3000 ft., the climate is cold in July. Some of his people had gone to Lake Nyassa to plunder without his knowledge, and he had ordered the captives and cattle to be sent back. It was gratifying to find that this was his spontaneous act; and I accidentally got a sight of the party, and found it to consist of 54 women and children, a dozen boys, and about 30 head of cattle. We remained a considerable time in his town, and longer in his district, which extends down to Lake Nyassa, 50 miles distant. He was very anxious that some of the freed boys from Nassick school should remain with him to show the use that could be made of his cattle in agriculture, but I could not prevail on any one to remain. One had discovered two uncles in the town, but refused to live with them. 'How can I remain where I have no mother and no sister?' was his invariable answer to the request for him to stop. I promised to endeavour to get some lads from the same school, who had acquired a knowledge of Indian agriculture, to show him how to make and use ploughs.

"Mataka provided amply for our wants and safety while in his district; but he could not control the Arabs, who have placed two dhows on the lake, and kept them out of our reach lest we should burn them as slavers. I was therefore forced to go round the southern extremity of the lake, instead of across the middle. There we visited the three most important Waijan chiefs, and those who are still the greatest slave-traders in the country. I do not know what effect, if any, our protests and explanations will have, but it seemed to be the first time they had heard their conduct condemned. They were very hospitable; and then an Arab, belonging to a slaving-party which had been plundered of its slaves, came to us, and so wrought on the fears of the Johanna men by tales of the terrible Mazitu, or Zulus, that their eyes actually stood out with terror. They ran away under the sole influence of fear, and left me with only nine Nassick boys. The Johanna men had proved themselves such inveterate thieves by the way, that it was a relief to get rid of them.

"We had been in Mataka's district from the middle of July till the end of September, and in the beginning of October tried to go westward, so as to avoid the Mazitu altogether; but the people of Katosa, or Kiemasura, were afraid to take us up Kirk's range, because some Arab slave-traders had been driven thence by the exasperated inhabitants. Katosa tried to get carriers for us, but in vain, and, being an old friend, he at last turned out with his wives to do the work himself. Six stout ladies took up our loads, and soon shamed the young men with their sharp tongues. The range is only the edge of a high plateau, where the people, all Manganja, have not yet been led into buying and selling

each other. We found them to be equally afraid of our people below, and, like all the interior people who have not been in contact with slavery, very kind. I gave a present of a cloth, and got ample provisions cooked for supper to the whole party, and breakfast the next morning. The people were supposed to be Maravi, but are in fact Manganja, under different names, as Kanthunda, Chipeta, Echewa, &c. Their land is high and cold. Their huts are plastered all over, even on the roofs, for the sake of heat by night. They are great agriculturists, and so many in number that one village is scarcely ever a mile from some other. We made short marches, and had a great deal of intercourse with these mountaineers; and possibly our account of the evils of the slave-trade may keep them from engaging in it headlong, as most Africans of this race are but too ready to do. The chief who had driven off the Arabs was delighted when I said I wished he would treat in the same manner all slaving parties of whatever colour, but complained that his countrymen would not join with him in expelling an invasion. This is true, for each village being independent of every other, they have no more cohesion than a rope of sand.

"As we went westward to avoid the Mazitu, we turned northwards as soon as we were past the longitude of their country, and nearly walked into the hands of a party out plundering. We met two villagers fleeing from them to some mountains, and went in the same direction in order to defend ourselves and them; but the Mazitu, after plundering the villages to which we were proceeding, turned off to the south-east. As we went northwards we saw more and more of their devastations, and suffered considerably from want of provisions. Crossing the Loangwa and the great valley in which it flows—the bed of an ancient lake—we entered Lobisa, a country of the Babisa, and for the first time got information as to the route the Portuguese followed in going to Cazembe. It is placed by the map-makers very much too far east. We never came upon it, so trod on new ground. It will enable one to form an idea of the way we went, if he conceives us going westwards from Katosa's, and then northwards till we take up the point at which we left off in 1863. The watershed between the Loangwa and Chambeze rises up to 6600 feet. The Chambeze was crossed in latitude $10^{\circ} 34' \text{ s}$. It had flooded all its banks with clear water, but the lines of trees showing its actual size were not more than 40 yards apart. I think that we are now on the watershed, though not the highest part of it, between Chambeze and Loapula. We have suffered a great deal from gnawing hunger. The Babisa, who were among the first natives to engage in slavery, have suffered its usual effects. Their country is depopulated, and the few inhabitants, now living at wide intervals from each other, had no provisions to sell. In the Loangwa valley, and also in that of the Chambeze, I had no difficulty in securing supplies of meat with the rifle; but Lobisa had no animals, and we had hard lines in marching through its dripping forests. We had no difficulties with the natives, other than those petty annoyances which are not wanting in even the smoothest life, and certainly not such as an explorer should moan over. This town has a treble line of stockades, and a deep ditch round the inner one. The chief seems a frank, jolly person, and, having cattle, we mean to rest a little with him. We are very much emaciated, but, like certain races of pigs, take on fat kindly. Our sorest loss has been all our medicines. We are 4500 feet above the sea, but, having rains every day, feel that we need, like the cattle of the people, the protection of huts. I regret that my geographical notes must be so scanty, but hope to send fuller information from Tanganyika. Our progress hitherto has been very slow. The boys cannot go more than 7 or 8 miles a day with their loads, and that is enough for me too with only a heavy rifle.

"I am, &c.,

"DAVID LIVINGSTONE."

3. *Letter to Dr. SEWARD, Consul at Zanzibar.*

"MY DEAR SEWARD,

“Bemba, 1st February, 1867.

"I send you my despatch to Lord Clarendon, and beg you to send a copy for Sir Bartle Frere's private information. I cannot possibly copy it, and have not taken a copy of the concluding sheet, nor of the geographical despatch.

"We found a party of Bagamoyo slavers here, all ready to start and hungry, so could not expect them to wait longer than a day. One of them was with Speke, so understands the nature of despatches, and I think they will be delivered. I send at the same time the documents you kindly lent, with many and sincere thanks.

"I sent a letter to go with the sepoys, but in charge of an Arab slaver named Suleiman, and fear that these fellows may have destroyed it. I shall first give you from memory the heads of the indictment.

"The sepoys seem to have planned my compulsory return as soon as they had killed all the beasts of burden; one camel they beat with the butts of their guns till he expired on the spot, and a mule was killed; certain sores were cruelly probed and lacerated when I was not in sight, and I came upon them one day when one was mauling a poor camel with a stick thicker than his arm; next day we had to leave it with inflammation of the hip-joint, the point where I saw the blows directed. They gave or paid 8 rupees into the hands of our Arab guide, to feed and take them down to the coast when the animals were all nearly done for, so sure were they of returning with their scheme triumphant. The havildar was seen paying the money by one of the Nassick boys. Then when we came to a part where provisions were scanty they refused to obey orders to come up to me, whither I had gone to secure provisions; and they would not rise in the mornings though called by the havildars, but I saw reason afterwards to believe that the havildars and Naik were art and part in the plot. A great deal of blubbering took place when I hauled them up, to send them back as prisoners. I sentenced the Naik to disratment, and all to carry small loads as punishment, but they were such a disgraceful-looking lot, and by disobedience had prevented my carrying out the only plan of getting provisions, namely by going forward and sending in all directions to purchase them, that they had to suffer hunger. They sold their cartridges, gave their muskets and belts to people to carry for them, telling them that I would pay for carriage, lay down perpetually in the march, and went to sleep. This was their custom all the way from the coast, and they were so filthy in their habits,—while we had plenty of food gorging themselves, then putting the finger down the throat to relieve their stomachs, and, lastly, they threatened to shoot the Nassick boys when away from English power in some quiet place, because, as they supposed, the boys were my informants.

"I sent them back from Mataka's, leaving sixty yards of cloth with that chief to give to the trader Suleiman, who was expected, and came a few days afterwards, to convey them to the coast. This cloth was amply sufficient for all their expenses. But I heard that the seven Mohammedans did not go with Suleiman, but remained at Mataka's, where food was abundant, and where their pay would be running on. They had their belts and ammunition-pouches, and muskets and bayonets, all complete then. The havildar pretended that he still wanted to go on with me; he thought I did not understand the part he had played: 'They won't obey me, and what am I to do?' was his way of speaking. 'Bring the first man to me who refuses a lawful order, and I shall make him obey.' None was ever brought. When he talked of going to die with me, I said nothing. He soon got sulky, and was a useless drag. I had to pay two yards of calico per day for carriage of his bed and cooking things,

and could make no use of him. He could not divide provisions even without partiality, nor measure off cloth to the natives without cheating them. He complained at last of unaccountable pains in his feet, ate a whole fowl for supper, slept soundly till daylight, and then commenced furious groaning. He carried his bed one mile the night before without orders, then gave off his musket and belt to a native, to blind me as to his having stolen and sold the cartridges. The native carriers would not follow us through a portion of jungle, and when I sent back for the loads, the gallant havildar was found sitting by his own baggage and *looking on* while the carriers paid themselves by opening one of the loads. He then turned back to join his fellows at Mataka's; the country abounded in provisions, and the people were very liberal.

"The Johanna men fled from sheer terror of an enemy they never saw. I shall pay them what they deserve; but certain advances were made to them, besides 29l. 4s. by Captain Garforth, which I must deduct.

"We have lately had a great deal of hunger: not a want of fine dishes, but want of all dishes except mushrooms. The rains are very heavy, and for six weeks we have had hard lines. The Babisa country is depopulated by their own slaving. We are going to rest here a little, and may be at Tanganyika by May, but we travel slowly.

"I have had no information whatever from the coast. If you can send anything more to Ujiji, on Lake Tanganyika, please send 50 lbs. of coffee, a small box of candles, a stick of sealing-wax, a cheese in tin, a small box of soap, some French preserved meats, half-a-dozen bottles of Port wine well packed, and some quinine and calomel, and resin of jalap,—don't exceed these quantities, please, for heavy things we cannot carry. Please pay for them with what you have in hand. The sorest loss I ever sustained was that of my medicines, every grain of them, except a little extract of hyoscyamus. We had plenty of provisions after we left Lake Nyassa, but latterly got into sore hunger.

"Don't think, please, that I make a moan over nothing but a little sharpness of appetite. I am a mere ruckle of bones, did all the hunting myself, and wet, hunger, and fatigue took away the flesh.

"Captain Frazer's rifle did good service—it is a splendid weapon; I feel extremely thankful for it.

"If Dr. Kirk is with you, will you give him all the information with kind regards. I cannot write to him at present.

"The head-man of the slaving party is named 'Maguru mafupi Nadim Sirkar a Lámji.' I told him to take the packet to the Sultan, as a letter for his Highness is on the outside, and you would pay whatever was right for the service on my account.

"Despatches are open, they may adhere from damp.

"DAVID LIVINGSTONE."

The following Despatch of Mr. Churchill, H.M. Consul at Zanzibar, to Lord Stanley, was next read:—

"MY LORD,

"Zanzibar, 27th January, 1868.

"I have the honour to report the receipt of letters from Dr. Livingstone.

"Bundouky (Gnu), or Muguru Mafupee (Short Legs), as his real name appears to be, who was said some four months ago to be on his way to the coast, arrived on the 24th inst., and delivered the long expected and welcome letters into my hands.

"While others who had left Wemba with Bundouky had reached this month ago, he had been, within a few days, a whole year on his journey. His excuse, which is after all a good one, is that he was detained in the interior by business.

"Dr. Livingstone's letters, which I have the honour to transmit to your Lordship, as per accompanying list, will speak for themselves.

"He was first deterred from passing to the north of the Nyassa by the dread his followers had conceived of the merciless Zulu or Mazitu tribe inhabiting the north-west borders of the lake. In proceeding towards the southern extremity, the behaviour of the sepoys was such—killing, as they did, the beasts of burthen, with the hope of inducing the traveller to return—that they had to be dismissed. The havildar had to be sent away next, and on attaining the south end of the Nyassa Lake the Johanna men left in a body. Dr. Livingstone, little disheartened by the dismemberment of his party, proceeded on his journey with only nine lads, hardly capable of carrying his lighter loads; and after many difficulties and privations, of which he will, it is to be hoped, live to give an account, he arrived on the 1st February, 1867, at Bemba or Wemba. Dr. Livingstone expected to reach the Tanganyika by the month of May last, and will have been at Ujiji in June. At Ujiji he will have found provisions and medicines sent to him in July, 1866, by Dr. Seward. It is little likely that further provisions sent to him now, reaching Ujiji, as they probably would, a year after his expected arrival there, would ever be received, particularly as no direction of his course is given after that place. Bundouky and his two companions, one of whom had accompanied Captain Burton to the Tanganyika as one of the 'sons of Rumjee,' were questioned with reference to the geography of the country between Wemba and the coast, and from their description it would appear that no river of any magnitude had been crossed anywhere. Nor does Dr. Livingstone mention the existence of a river of any size other than the Chambesi, or Zambesi, and the Loapula, which do not join the Tanganyika or the Nyassa. Under such circumstances (a complete circle having been described round the Nyassa conjointly by Dr. Livingstone and Bundouky's party), the important question of the disconnection of the Nyassa and the Tanganyika, as Dr. Kirk well observes, appears to be satisfactorily solved.

"It may be interesting to your Lordship to read what Bundouky and his companions say relative to the country they have travelled over; and although information of this nature cannot be implicitly relied on, it is, nevertheless, not quite valueless. I beg leave to transmit to your Lordship a transcript of Bundouky's replies to my questions.

"The Johanna men deserve punishment for the want of truth they have exhibited in reporting Dr. Livingstone's death. I propose addressing his Highness Sultan Abdallah and Mr. Sunley on the subject, as soon as an opportunity offers.

"I have, &c.,

"H. G. W. CHURCHILL."

The following Postscript to a letter of later date, from Mr. Churchill, was also read:—

"P.S.—We have further news of Dr. Livingstone's arrival at Ujiji towards the middle of last October, as your Lordship will perceive from Issa ben Abdallah's statement.

"February 7th, 1868."

"Statement of ISSA BEN ABDALLAH KHARRUSEE, an ivory merchant, who has just arrived from Ujiji.

"I left Ujiji on October 6, and went to Salusee, where I remained ten days previous to setting out for the coast. While there I learnt that an European, an Englishman, had arrived at Ujiji. Mussa, a person established at Ujiji, was expecting him when I was at Ujiji.

"Transcribed by H. A. CHURCHILL,

"Zanzibar, 5th February, 1868."

The PRESIDENT then read extracts from a letter which had been addressed by Dr. Livingstone to Sir Bartle Frere, late Governor of Bombay, under whose auspices the expedition started:—

“Bemba, 1st February, 1867.

“I had no prospect of sending coastwise, but here I met a party of black Arab slave-traders from Bagamoio, near Zanzibar, and while they agree to take a packet they will not wait more than half a day for me to write; they have come here for the first time, about 10° 10' s. lat., and 31° 50' E. long.

“We have been a long time in making our way here, but some of the delay was pleasant, for I had intercourse with people who had not engaged in the slave-trade. We came round the south end of the lake. I was apprehensive if I took my Johanna men round the northern extremity they would bolt at the first sight of danger. They actually did run away on mere report of the doings of the terrible Mazitu or Zulus, and I was left with a following of nine Africans, six of whom are Nassick boys. The Johanna men had proved themselves such thieves it was a relief to get rid of them. The most influential chief on the watershed between coast and lake, called Mataka, wished very much that some of the boys would remain with him and show the use that could be made of his cattle in agriculture. Abraham met two uncles there, but no entreaty would induce him to remain, though Mataka was extremely liberal and seemed to please them all. ‘How can I stop where I have no mother and no sister?’ was the invariable reply. I promised to try and get some boys acquainted with Indian agriculture from the same school; but the system of teaching for India and not for Africa had better be altered. Abraham has done good service to me since, so I have no reason to be dissatisfied with him.

“I was obliged to go very cautiously, and seven or eight miles was all we could accomplish in a day. We went westwards from the west of the lake, ascended Kirk’s range, which is only the edge of a plateau densely peopled with various tribes of Manganja who have not yet engaged in slaving. After going westwards till we were past the longitude of the Mazitu, we turned to the north, and taking up the point we left off at in 1863, we continued our northerly course, at times making a little westing. We crossed the wide valley in which the Loangwa flows—the bed of an ancient lake—then ascended the heights of Lobisa in the southern borders of lat. 11° s. Here we came to a depopulated country, an immense forest. The Babisa were eager slave-traders, and the ruin that has followed that traffic is now apparent in only a few hamlets occurring at wide intervals, and small patches of a species of millet at various parts in the jungle. The people had little or no grain to sell; they were living on mushrooms chiefly. While in the valley of the Loangwa we had plenty of game, and easily kept the pots boiling; but here not a beast was to be seen, and daily trudging through dripping sloppy forests, with the feet almost constantly wet, and gnawing hunger in the inner man, took the flesh off our bones. We crossed the Chambeze, as the Zambesi is here called, in lat. 10° 34' s., only 40 yards wide; but it had plenty of animals on its banks, and we soon got a supply of meat. This, the chief town of this side of Bemba, has a treble stockade round it, the inner line having a deep ditch besides. If I am not mistaken, we are on the watershed between the Chambeze and the Luapula, which is said to flow into the Lake Tanganyika. It is said to be very large; but I hope to let you know better from the lake itself, where I hope to find letters and our second supply of goods. We are 4500 feet above the sea, the temperature cool, and the rains more abundant than I ever saw them in Africa. Very few days pass without a shower. The interior is chiefly forest, and excessively leafy: one can see but a little way off from an elevation. The gum-copal and another tree abound, with rhododendrons and various evergreen trees—the two first furnish the bark-cloth which is the principal clothing of

the people. We have had no difficulties with the natives. Hunger and wet have been our greatest hindrances. We could not for some time find out where the Portuguese route to Cazembe lay, but it has been placed by the map-makers too far east. Hence they had no mountain chains such as we have met with. The watershed between the Loangwa and the Chambeze is 6600 feet above the sea.

"In case the sepoys destroyed my letter which I sent back with them, I may say that their scheme was to force me to return as soon as they had killed all the beasts of burden. The havildar actually paid on behalf of the rest eight rupees to our Arab guide to feed and lead them back to the coast. When found out, there was a good deal of blubbering, and they eagerly accepted a sentence to carry light loads. They obeyed none of the havildar's orders, he evidently conniving with them. They were an intolerable drag, and frustrated the best means I could devise for securing provisions, namely, by my going forward and sending in all directions for food. They would not march if I were not present, and even then, when I was out of sight they lay down and slept. On finding that one Bunach threatened to shoot a Nassick boy when he got him out of English power, I sent them back with ample cloth in the hands of a merchant to pay all expenses. The havildar came on, but could be made of no use in any way; and when we heard at the lake that the seven Mahomedans of the party had remained at Mataka's, where food was abundant, in order probably to let their pay accumulate while they played the mendicant, the havildar became sulky, shammed unaccountable pains in his feet, and returned to join the others.

"Mataka's town and country are the most likely for a permanent settlement to be made. It is elevated and cool. English peas were in full bearing and bloom in July; the altitude is over 3000 feet, and his country is mountainous and abounds in running streams, the sources of the Rovuma. Dr. Norman Macleod promised me to try and get some German missionaries from Harmsburg in Hanover, and salaries for them, if I could indicate a locality. These same men go without salaries, and are artificers of different kinds; but this is a mistake, they ought to have a little, for some of them have in sheer want taken to selling brandy even, but at Mataka's they could easily raise wheat by sowing it at the proper time, and native produce when the rains come, but it would require a leader of some energy, and not a fellow who would wring his hands if he had no sugar to his tea. I have almost forgotten the taste of sugar, and tea is made by roasting a little Joare, and calling the decoction either tea or coffee. I have written to the Doctor, and given some account of the difficulties to be overcome; 300 miles is a long way to go, but I feel more and more convinced that Africa must be Christianized from within.

"Believe me, affectionately yours,

"DAVID LIVINGSTONE.

"P.S.—His Highness the Sultan did all he could for us, and was extremely kind; but his people, to whom I bore an epistle, all skeddaddled as soon as they heard that the 'English were coming.' The dhows (two) on the lake were kept out of my way, lest I should burn them as slavers! and I could not get across the middle of the lake."

The PRESIDENT said that the question in which geographers and the British public at large were now interested, was the future course of Livingstone, and at what time he might be expected to return. In the journey from the place at which he disembarked, Mikindany Bay, to the south end of the Lake Nyassa, he occupied seven months; but for three weeks or more of that time he remained at Mataka's. The distance traversed from the coast was only 500 miles. During those seven months people often asked in England, "Why does not Livingstone send us some account of his proceedings? The sepoys

have returned, but they have brought no despatches." He (the President) was sorry to say that the sepoys behaved extremely ill. We now had in Livingstone's own handwriting the statement that they were the worst of companions, inferior even to the Johanna men. He entrusted to the sepoys a despatch, which they never delivered. The next part of Livingstone's journey, after crossing the Shiré, was to the west and northwards, taking a circuitous course, in order to avoid the Mazitu. It occupied five months, the date of the despatches being the 1st of February, when he was at Bemba. The progress made to this point would enable us to judge of the time he was likely to take in accomplishing the remainder of his journey. We now know that he had arrived at Ujiji, on the eastern shores of Lake Tanganyika by about the middle of October last. The distance between Bemba and Ujiji was only 500 miles; but he (the President) was delighted to hear that the traveller had been so long on this part of his route, because it implied that he had devoted himself to examining Tanganyika, which had never yet been explored. It was not known whether the rivers at the southern end ran into it or out of it. When Burton and Speke crossed the lake in the northern part at Ujiji, they knew nothing of the southern part except from information furnished by Arabs. If Livingstone found the waters flowing northward from the neighbourhood of Bemba, whence he wrote, and into the Lake Tanganyika, he would continue his journey to the northern end. There would then lie before him another great problem, the solution of which would be the settlement of the geography of the whole interior of Africa. If, according to the theory of Mr. Findlay, which had been read before the Society, the waters of Lake Tanganyika flowed into the lake Albert Nyanza, the geographical object of Livingstone's expedition would be accomplished. He would be upon the waters of the Nile, and having determined that great physical problem, he would probably turn to the eastward and reach the coast at Zanzibar. If, on the contrary, it proved, as shown on the original map of Burton and Speke, that a mountain range separated Tanganyika from Albert Nyanza, the outflow of the waters of Tanganyika must be sought for on its western side; for being fresh, those waters must have a free outlet in some direction. In this case, Livingstone might be induced to follow that river wherever he found it. It was known that there was no outflow to the east, because the country on that side had been explored, and no great stream found. To follow such a western outlet would lead him far across the great unknown western interior of Africa. Such was Livingstone's great vigour and audacity in meeting every difficulty that he (Sir Roderick) had not the slightest doubt that he would pursue such a river, if found, and come out on the west coast, where his first expedition terminated, before he recrossed to the Zambesi. In this case we must not expect to hear of him for twelve or even eighteen months. But if, under the hypothesis which he (the President) rather held to, Livingstone found the waters of the Tanganyika flowing into Baker's lake, and turned back towards Zanzibar, as most probably he would do, he might be expected in England in the month of September next. A third hypothesis was, that having since arrived at the lake of Sir Samuel Baker, he would follow its waters and come out at the source of the Nile. He (the President) had dismissed that hypothesis from his own mind, in consequence of the small force which Livingstone had at his disposal, and the diminished store of goods for presents to give to the equatorial kings. Knowing the difficulties which Speke and Grant and Baker had in those countries, he would pause before concluding that he had taken that route, particularly after he had geographically solved the problem. Another reason which operated in his (the President's) mind against the third hypothesis was, that Livingstone would have to go through the whole of the White Nile region, where the slave trade was carried on to an abominable extent.

Sir SAMUEL BAKER said that he had been perfectly charmed, not only with the ability, of which they were all cognisant, which the President had displayed in his remarks, but also with a particular phrase of which he made use, which was that the public were interested now with the "future of Livingstone." Never in his life did he (Sir Samuel) confess that he was wrong with such intense pleasure as he did to-night. The difference between himself and Sir Roderick Murchison was that the latter was the great theoretical African traveller, while he (Sir Samuel) was a practical one. The President had adhered to his friend Dr. Livingstone, as he always did to all his friends, and particularly his geographical ones; and he would not allow that Livingstone was dead, although the evidence of the fact was such as would have been accepted as legal by any jury of twelve. It was now found that Sir Roderick was right, and that Livingstone was still alive. The difference between the President and himself (Sir Samuel) was, that while the former was now delighted at being right, he (the Speaker) was delighted at being wrong: for if he had been right, not only he but the whole world would have lost a friend; but as Sir Roderick was right the whole world had regained a friend. Livingstone was a man who would have the opportunity of doing what few men could do, namely, of reading his own epitaph, and knowing the world's opinion of him after his supposed death. When Livingstone last wrote he was in latitude 10° s. When he was last heard of he was supposed to be near Ujiji, in October. At that time the people must have been departing with their ivory to Zanzibar. These people had to depend upon seasons, and hence they would have missed the letters which Livingstone would have sent had he arrived in time. He must be without the means of communication until the next season should arrive for the departure of the caravans. The President agreed with him in believing that Livingstone would not take the northern journey. He (Sir Samuel) could not conceive that any man of Livingstone's experience would undertake the great voyage to the north, having arrived, after an African journey of nearly two years, at Ujiji, with his medicine chest lost and his funds exhausted, unless he there received very large supplies both of funds and physic. To extend his journey northward without medicine, without large supplies to satisfy the exorbitant demands of the African kings, and without that vigour which travellers carried with them when fresh from England, would be a most frightful task; and he (Sir Samuel Baker) hoped that instead of undertaking it, Livingstone would return to England, which, in that case, he would do within a very short space of time. The question arose, where could the meeting be held to receive him when he should return? It would be impossible to accommodate him in the usual meeting-hall, and it had been suggested that the Society should apply to Mr. Spurgeon for the Tabernacle, or to Mr. Beales for the use of Hyde Park, on such an occasion. But wherever they received him it would be with open arms. It was the duty of the Society to tender their thanks to their father, the President, who watched over the members in their travels with a paternal regard. When the world believed that Livingstone was dead, and had awarded him their tribute of praise, there was still one man, and almost only one, who stood by and said, "He is not dead," simply because his kind heart would not allow him to die.

The Rev. H. WALLER said that he had received from Dr. Livingstone a very long letter dated the 2nd of February, in which he spoke of Lake Nyassa and of the dreadful slave-trade going on there, and which was now raging worse than ever. He spoke of countries depopulated, and of the old horrors with which those who had been with him were familiar. Although Dr. Livingstone was, perhaps, the principal geographer of the present day, he was not travelling without an object still higher than geography. His future task would be to turn to account the knowledge which he was now gathering. He was travel-

ling through a country which was utterly spoiled and torn to pieces by the slave-trade. He was penetrating into the back provinces of that trade, and he looked to the English nation to take some notice of it. The Sultan of Zanzibar was willing to throw himself into the hands of the British Government as an instrument in stopping the slave-trade. The traffic was an abomination, and ought to be stopped. He (Mr. Waller) regretted that his friend Mr. Young was not present to share the joy of the Society in hearing of Dr. Livingstone's safety. All Mr. Young's suggestions were borne out to the letter by the communications that had been received. He (Mr. Waller) would not venture to speak of Dr. Livingstone's future movements in the presence of Sir Roderick Murchison, to whom he should henceforth bow as the prophet of Africa. If Sir Roderick said that Livingstone would come out on the west coast he (Mr. Waller) would at once crush his idea that he was coming out at Alexandria. He could endorse Sir Samuel Baker's expression of appreciation of that kindness of heart on the part of the President which had followed African explorers. He had been present in Africa when despatches had been opened from Sir Roderick, and he could testify to the delight felt by travellers for the kindness with which he had ever watched over them.

The PRESIDENT, in reference to the observations of Mr. Waller, remarked that Livingstone had on this journey passed through countries not troubled by the slave-trade; he had seen extensive tracts inhabited by very happy people, where the slave-trade was unknown. Mr. Young, to whom the last speaker had alluded, had received the unanimous thanks of the Society, and he (the President) had dwelt particularly, at the commencement of the evening, on the most admirable expedition of Mr. Young. Without his good conduct of that expedition they would never have been able at that time to expose the lie respecting the death of Livingstone.

Captain SHERARD OSBORN was prepared, as in former days, to believe in Livingstone's success. With regard to his future course, he accepted the first hypothesis enunciated by the President so far as related to the belief that Lake Tanganyika flowed to the north; but he was obliged to differ from him in supposing that Livingstone would turn back to Zanzibar after assuring himself of that fact. Reviewing the difficulties he had encountered for the two years previously, and finding water-communication between him and the Nile, he thought he would be more likely to take to boat and sail on to Gondokoro, than to return by land to Zanzibar. He (Captain Osborn) could not conceive that Livingstone would turn to the westward, where there was a huge blank of which he was not cognizant. If, as Mr. Findlay believed, there were an opening to the northward, he would probably pass that way in spite of the difficulties of the route, with which he was not unacquainted. He advocated the notion of sending an expedition up the Nile to meet the traveller.

The following Paper was then read by the Author.

A Journey from Norton Sound, Behring Sea, to Fort Youkon, at the Junction of the Porcupine and Youkon Rivers. By Frederick WHYMPER, Esq.

THE author stated that the journey was made in the service of the Russo-American Telegraph Expedition, since abandoned. During the winters of 1865-6 and 1866-7, there were stations at the Anadyr River and at Plover Bay in Eastern Siberia; at Port Clarence and Norton Sound, and on the great Youkon River, in Russian

America. The men were engaged both exploring and erecting the telegraph, in a temperature frequently below the freezing point of mercury; minus 58° Fahr. was their lowest recorded temperature in Russian America. The axe-men, in cutting poles, found their tools continually losing their edge, or cracking into pieces. Health was, nevertheless, preserved and the work carried forward throughout the winter. Both "Youkon" and Kwich-pak (pronounced Kwif-päk), the two names of the river, are Indian words, signifying "big river." After giving a sketch of the various explorations of the river, the author proceeded to narrate that he was attached to the Youkon division of the telegraph party in September, 1866. On the 2nd of October he went to Unalacheet, in a small steamer from Norton Sound; the Unalacheet River was then frozen up, and ice was forming on the coast. On the 7th of October the steamer was beached for the winter, and he travelled by land and by the frozen Youkon to Nulato, where he arrived on the 15th of November. Nulato is the most interior and northern fort of the Russian-American Fur Company. Indians resort hither from a distance of 300 miles to barter their furs; as many as 5000 marten-skins have been brought by them in one year, besides other furs. During the winter he observed the Indian mode of fishing through the ice on the Youkon. Early in the season large stakes were driven down through the ice to the bottom of the river. To these were affixed traps, consisting simply of a wicker funnel leading into a long basket. Oblong holes in the ice above them were kept open through frequent breaking, and sometimes a great haul of fish was the result, when the traps were raised. On the 10th of April the willows began to bud; on the 28th the first goose arrived from the south, and on the 13th of May swallows were flitting around the fort. The break-up of the great river was an interesting sight: it made its first move on the 19th of May; a constant stream of broken ice swept down, surging into vast piles, grinding and crashing on its way; the banks were torn and swept away, and the water rose 14 feet above its winter-level. On the 26th of May Mr. Whympers and Mr. Dall commenced their journey up the great stream: 600 miles above its mouth it was a mile and a quarter wide, with a current, at this season, of 6 knots an hour. They passed the mouths of many large tributaries and several deep bays, and reached Nuclukayette, the furthest point ever reached by the Russian fur-traders, on the 8th of June. Beyond this they entered an unexplored part of the river. The days now became too hot for travelling—sometimes 78° in the shade, and they progressed only during the twilight hours of night. The only rapids met with for 1200 miles were a day's journey

above Nuclukayette, but they passed through with very little trouble. Fort Youkon (belonging to the Hudson's Bay Company) was reached on the 23rd of June. On the 8th of July the party—increased to four, besides Indians—commenced the return voyage; the birch-bark canoes were lashed together, and suffered to float down with the current, travelling at the rate of 100 miles in 24 hours. At Nulato they stopped two days, and resumed their voyage in a larger boat obtained from the Russians. The Indians in the lower part of the river were found busily occupied in taking salmon and drying it for winter use. Towards the delta the current was more sluggish, averaging about 3 knots an hour. Long stretches of low country extend in all directions, with islands, sand-banks, and channels innumerable. The author believed that a flat-bottomed steamer of good power, capable of going 10 knots an hour, might navigate the Youkon for a distance of 1800 miles. Soundings were taken at the various mouths of the river by officers belonging to the expedition, and the Aphoon mouth, or most northerly, fixed upon as the only available one for vessels. A warm acknowledgment of the kindness and ability of the American gentlemen comprising the expedition brought the Paper to a conclusion.

The paper will be printed entire in the 'Journal,' vol. xxxviii.

The PRESIDENT reminded the meeting that the region traversed by the great Youkon River was now handed over to the Americans. The author of the Paper had not led the Society to suppose that the new possessors would obtain a great deal of profit from the acquisition, except it were by the skins and furs which the country furnished in abundance. He confessed that, until informed by the Paper, he was unaware of the course and magnitude of the Youkon, and he only wished that it flowed through a more fertile country.

Captain BEDFORD PIM said he rose to pay his tribute of admiration to Mr. Whymper for his adventurous journey. The Paper which he had written was of very considerable importance, as being the only account we have yet had of this extensive region. The Youkon was especially interesting to Englishmen as being the locality in which the first traces of the Franklin expedition were heard of. He had himself made a journey from Kotzebue Sound to Michaelovskoi Redoubt in search of traces of Franklin; and Lieutenant Barnard was killed while following up traces which he (Captain Pim) had been the first to hear of. It would be seen from the Paper how easy it was for the Indians to bring the guns and other relics of the expedition down to Derabin by means of the river. He was not quite sure he was in order, but if so he would move the adjournment of the discussion on the Paper, as the hour was too late now to do justice to this very important subject.

Eleventh Meeting, May 11th, 1868.

SIR RODERICK I. MURCHISON, BART., K.C.B., PRESIDENT, in
the Chair.

ELECTIONS.—*Matthew Blakiston, Esq.*; *F. Barlow, Esq.*; *William Busk, Esq.*; *F. C. Cory, Esq., M.D.*; *Andrew Ellison, Esq., C.E.*; *John T. Fletcher, Esq.*; *Henry Freeman, Esq.*; *J. L. Hart, Esq.*; *Rev. Walter Hiley, M.A.*; *Major T. J. Holland*; *Samuel Hoare, Esq., M.A.*; *Stephen J. Hobson, Esq.*; *William S. Jones, Esq.*; *Lieutenant-Colonel H. Le Couteur*; *Robert Montgomerie Miller, Esq.*; *Robert Michell, Esq.*; *Charles M. MacGregor* (Lieutenant Bengal Staff Corps); *J. H. Paull, Esq., M.D.*; *Alfred Richards, Esq.*; *Charles W. Roberts, Esq.*; *Percy J. Rowlands, Esq.*; *Rev. C. F. Stovin*; *Graham Manners-Sutton, Esq.*; *Colonel Robert Wardlaw.*

ACCESSIONS TO LIBRARY TO MAY 11TH, 1868.—‘*La Turquie sous le Règne d’Abdul-Aziz, 1862-1867.*’ Par F. Millingen. Street’s ‘*Indian and Colonial Mercantile Directory for 1867-68.*’ Donor, the author. ‘*Tenerife geologisch-topographisch dargestellt von Fritsch, Hartung und W. Reiss.*’ Purchased. ‘*South Australia.*’ By Anthony Forster. 1866. Donor, the author. ‘*Brazil.*’ By Professor and Mrs. L. Agassiz. 1868. Purchased. ‘*Interior of South Africa.*’ By James Chapman. Purchased. ‘*Twenty-four Views of the Vegetation of the Coasts and Islands of the Pacific.*’ By F. H. Kittlitz. Purchased. ‘*Voyage dans l’Afrique Australe, par A. Delegorgue, 1847.*’ Purchased. Horneman’s ‘*Voyage dans l’Afrique Septentrionale, 1803.*’ Donor, W. D. Cooley, Esq. Vayssièr’s ‘*Voyage en Abyssinie, 1857.*’ Donor, W. D. Cooley, Esq. ‘*Political Missions to Bootan.*’ Calcutta, 1865. Purchased. Reland’s ‘*Palestine.*’ 1714. Rohlfs’ ‘*Afrikanische Reisen.*’ Pajkull’s ‘*Iceland.*’ Marsh’s ‘*Man in Nature.*’ Orme’s ‘*Hindostan.*’ Cunningham’s ‘*Buddhist Monasteries in India.*’ Darwin’s ‘*Volcanoes.*’ Darwin’s ‘*Geological Survey of South America.*’ Engraved portraits of early voyagers and travellers:—Capt. Cook, Dampier, Drake, Banks, Ross, La Pérouse. Purchased.

ACCESSIONS TO MAP-ROOM SINCE THE LAST MEETING OF APRIL 27TH.—Abyssinia, part of: from Tekonda to Addigerat, with a view of Magdala. Ditto: from Addigerat to Magdala. Presented by Dr. A. Petermann. A. Stieler’s Hand Atlas. Twelve parts of ditto, viz.: Nos. 2, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, and 25. A. Stieler’s Karte von Deutschland, four parts, viz.: Nos. 3, 4, 5, 6, 7, and 8. Presented by the author. Peru: Section of Route from Iquique on

the Pacific across the Cordilleras and Great Salinas to Potosi. Presented by W. Bollaert, Esq., F.R.G.S. Peru: a tracing of a Route from Húanuco to Puerto Prado, with Sections of Elevations, &c., by Messrs. A. Wetherman and J. K. Tucker, 1867. Presented by Don M. F. Paz-Soldan, Honorary Corresponding Member. Map of British Honduras, by J. H. Faber, Esq., Crown Surveyor. Presented by Sir Frederic Rogers, Bart., Under Secretary of State, Colonial Office. A Map of part of Armenia, showing Lake Van, by Major Frederick Millingen; two copies. A Litho-photographic Impression of the Diagram, 'Island of Santorin,' executed by a new system of lithographic printing, with several specimens of other subjects. Presented by Mr. R. Warner, of the Litho-photographic Institute. Map of part of Central Abyssinia, based upon the Surveys and Explorations of various authors, brought up to the present time. Presented by the War Office, through Sir Edward Lugard.

The following papers were read :—

1. *On the Peninsula of Sinai.* By the Rev. F. W. HOLLAND, M.A.,
F.R.G.S.

THE author stated that the experience he had gained during a former visit to Sinai, in 1861, had enabled him to adopt a more independent mode of travelling than is usually followed in that country; and, dispensing with the services of a dragoman, he had now traversed on foot, in two journeys, a very large portion of the peninsula. He commenced his last journey at Suez on the 10th of October last, taking with him four camels laden with provisions for four months, a small tent, and other necessaries. His plan was to make the monastery at the foot of Mount Sinai his first point, to establish there his dépôt, and make it his head-quarters while he was examining the surrounding country.

Crossing the head of the Gulf of Suez he kept along the coast until, on the third day, he reached the mouth of Wady Ghurundel. Here he stopped to pay a visit to the hot springs of Jebel Hummam Faroun, a mountain which cuts off further progress along the coast. The lower portion of the wady is one of the most fertile in the peninsula, containing a perennial stream, along which are found wild ducks and many kinds of smaller birds. After keeping up Wady Ghurundel for a few miles, he again struck southwards across a limestone plateau behind the Hummam Range, and descended again to the sea by Wady Taiyibeh, continuing thence along the Plain of El Morkha until he reached the mouth of Wady Feiran. Taking the main road to Jebel Musa, which lies up this wady and

Wady Es-Sheikh, Mr. Holland reached the convent on the 19th of October, and, dismissing his Arabs, took up his quarters with the twenty-six Greek monks who live there.

During his stay he occupied a little room at the top of the convent. He was awake every morning at sunrise, by the clanging of the pieces of iron and wooden boards, used as bells to call the monks to service. Going to the pilgrims' kitchen, where the monks always had wood and water placed for him, he lighted a fire and prepared his breakfast, after which he started on his day's journey of exploration. He found that the monks and their attendants knew little or nothing of the country, and refused all their offers to serve him as guides, depending rather for information of mountain-paths on the Arab ibex-hunters. Leaving the convent he used to let himself down from a little gate in the garden-wall by a rope, and proceeded on his rambles. By the 7th of November he had explored most of the surrounding country within a day's walk of the convent, and began to make more lengthy excursions to distant parts of the peninsula, taking with him an Arab to carry his blanket and bag of provisions, and sleeping out three or four nights in succession. Water he found not nearly so scarce in the granitic district as had been supposed, and there was a far larger amount of vegetation than had usually been described. In his longer excursions he explored Jebel Um Shaumer (which he ascertained to be considerably lower than Jebel Katherine), Jebel Hadeed, Jebel Eth Thebt and the important wadies stretching from it, Senned, Jebel Serbal, Ras Mohammed, the mines of Serabit-el-Kadim, Ain Huthera, Jebel Odjmeh, and many other places of interest in the neighbourhood. On the 3rd of December he witnessed a fearful thunderstorm and flood, whilst encamped in Wady Feiran, near Jebel Serbal. After a little more than an hour's deluging rain, the dry wady was transformed into a foaming torrent, 300 yards broad and from 8 to 10 feet deep, sweeping away many Arabs with their tents and flocks, and hundreds of beautiful palm-trees. With regard to the route followed by the Israelites, the author came to different conclusions, on many points, from those usually received. In the first place, as regards Ain Huthera, identified as Hazeroth, the third station of the Israelites after leaving Mount Sinai, he found its position quite precluded all idea of its being one of the stations, for it lies in a complete *cul-de-sac*. The site of the battle of Rephidim, he showed reasons for fixing in the Wady Es Sheikh, at a spot about 10 miles from Jebel Musa. The Arabs here point out the "Mokad Nebi Mûsa," i. e. "the Seat of the Prophet Moses," at the foot of which the wady cuts through the long ridge of granite which stretches north-

eastward across the centre of the peninsula. Here the Amalekites probably awaited the arrival of the Israelites, and the rock above was the hill on which Moses took his stand. The course of the Israelites, after crossing the Red Sea, he believed to be along the lower road by the coast to Ain Szouweira (*Marah*), thence inland to Ain Howara (*Elim*); afterwards again by the sea near the mouth of Wady Ghurundel. The *Wilderness of Sin* he would identify with the plain of Es Seyh; *Dophkah* he would place near the head of Wady Berah; *Alush* at Wady El Osh, and the route thence to the Rephidim and Mount Sinai up Wady Es Sheikh. One mountain only appeared to the author able to enter into competition with Jebel Mûsa, as Mount Sinai: this was Jebel Um Alowee, "the Mother of Heights." The plain Senned, which lies beneath this mountain and contains an area of nearly thirty square miles, is capable of holding a much larger host than that at the foot of Jebel Mûsa.

In conclusion, the author protested against the theory that the Sinaitic inscriptions were the work of the Children of Israel. He had carefully examined hundreds of them, and had not found one single point in favour of such a theory. The strongest evidence against it is the existence of a bilingual inscription, Greek and Sinaitic. But who the authors of the inscriptions were, remains a matter of doubt. Mr. Holland discovered, however, that they were almost all engraved with stones.

The paper will be printed entire, with map, in the 'Journal,' vol. xxxviii.

The PRESIDENT returned the thanks of the meeting to Mr. Holland, and said that he had heard no paper on subjects of biblical history which had gone so far as the present one to realise the accounts given in Scripture. The paper was not only extremely interesting as a narrative, but had thrown much new light on geographical questions in which we were much interested. He was delighted that there was connected with the Society a gentleman who was such an ornament to the Church, and so good a geographer.

Captain FELIX JONES said that it was upwards of thirty-eight years since he traversed the Peninsula of Sinai; and his journey was undertaken with a view more to the general geographical survey of the Red Sea and the Gulf of Akabah than to the detailed exploration of the peninsula. He traversed that country at a time when Europeans were exposed to great danger in travelling there. He was a companion of the celebrated traveller Welbey, and went over with him the whole of the peninsula. Their sole object was to ascertain the altitude of the principal mountains and certain positions. Those points were fixed trigonometrically and astronomically; but during the last thirty years the original drawings of those surveys had been lost, as had surveys of a more recent date, merely through want of care in the official departments. Of the labours of himself and companion in connexion with Sinai, nothing remained but the reduced charts of the surveys of the Red Sea. It would be highly interesting to have such a survey as that of which Mr. Holland spoke, undertaken

with a view to settle the topography of this very interesting country. He could bear witness to the exactitude of most of what Mr. Holland had stated with respect to the principal geographical features and the mines. Those mines must have been worked at a very remote period; the word which had descended as the name of the place where they were situated meant "a cave," and was no doubt given on account of the operations which were conducted there. Great credit was due to Mr. Holland for the very great pains with which he had investigated the country generally, and for the admirable map he had placed before the meeting.

Mr. CYRIL GRAHAM said he must pay his tribute of admiration to Mr. Holland's enterprise. The results at which he had arrived were due to the indefatigable zeal and industry which had led him to pursue his researches on foot. Mr. Graham would wish to call attention to the Amalekite ruins which had been described as round, and dome-shaped, and to the legend which attributed their erection to the necessity of a refuge against mosquitoes. Connected with this, Mr. Holland had also alluded, with certain discredit, to a tradition which covered the peninsula with trees in ancient days. Now he (Mr. Graham), as a rule, laid the greatest stress upon unwritten tradition, especially in an instance like the present, when it bears no traces of a foreign touch. Trees and mosquitoes naturally go together, and the story of the ruins, too simple to be designed, probably records an important fact in the natural aspect of that country. In all parts of the globe where forests perish, rain ceases or diminishes in quantity, and desiccation, of course, follows. Such a change has occurred, not only in Sinai, but Central Arabia and Asia, and many other regions. As for the *Sinaitic* writings, he (Mr. Graham) considered them now to be tolerably well understood. They belong to one of the many Sinaitic dialects which are to be found perpetuated in cursive characters between the Tigris and the Red Sea. The bilingual inscription is interesting, and should help in the further task of deciphering. The copper mines, as Egyptologists know, were already worked by the sovereigns of the 4th dynasty, long before the time of Abraham. The curious group of stones, called El-'Ojmah, to which Mr. Holland had pointed on the map as a series of rocks hanging in festoons, derived its name from the Semitic word '*ajamah*, which, in one sense, implied confusion.

Captain FELIX JONES asked whether it did not also mean "a heap."

Mr. CYRIL GRAHAM replied that it did, but that "confusion" was the primary meaning involved. A babbler, or one who talked a foreign tongue, for instance, was called '*ajami*, a term synonymous with *Berber*, *barbaros*, and the Teutonic *Welsh*. In the above sense—of confusion—he was inclined to think it was applied to the rocks by the Amalekites, or Nabatheans, the latter of whom were, without doubt, the earliest inhabitants of the district of whom we have any knowledge.

Mr. KENNELLY said he would mention a fact connected with the physical geography of the Gulf of Suez, which he had been led to investigate some years ago, when stationed in the Red Sea, and which he believed would tend to support the theory of the author of the Paper that the Israelites had crossed at some place near the head of the Gulf, and that, having crossed, they had for the first days of their journey kept close to the sea shore. It would be noticed that at the base of the high land of Jebel Ataka, there runs for a considerable distance into the Gulf a low cape of the same name. Now from this cape, in a direction of E.N.E. to the opposite shore, between Gad ul Murkub and the wells of Moses, there exists a shallow bank, composed of irregular patches, with a depth of water varying from four to six fathoms. Its length from shore to shore is four miles, and its breadth a little over three-fourths of a mile, while on each side there are corresponding depths of eight and ten fathoms. He was led, therefore, to believe that the

miraculous passage across the sea was effected upon this bank, which by the action of the strong east wind, that was made to blow all the night, in sweeping the waters into the northern end of the Gulf, would be laid bare, and give to the Israelite host a broad and comparatively easy passage to the opposite shore, while on either hand there would remain a depth of water sufficient to constitute a "wall," in the sense in which the same Hebrew word is employed elsewhere in the old Scriptures. It was a known fact that in the present day a similar phenomenon, on a more limited scale, occurs in the Red Sea. After a gale of some continuance up or down the sea, the "Dædalus" reef is seen to be comparatively dry or submerged, according as the gale may be from the north or south.

Sir SAMUEL BAKER said that he could not help thinking, after the reading of the paper, how much better it would be for young men with strong legs and good heads to pass their holiday time in the manner adopted by Mr. Holland, than to occupy it in going to those miserable Alps, and climbing up simply to tumble down again. He believed—and he thought that Sir Roderick Murchison would be inclined to second him in the opinion—that in the Exodus from Egypt Moses, under Providence, owed much of his success to his geographical knowledge. After reading Mr. Holland's paper, he had referred to Josephus, in whose works he found a passage which exactly bore out the belief which the inhabitants of Sinai held at the present day, that there was some mysterious connection with God in the mountain of Sinai. Mr. Holland had mentioned reports like the firing of guns, which of course were naturally caused by the falling of rocks. In the time of which Josephus wrote, the people had the same idea that there was something supernatural connected with that precipitous mountain. Josephus's account was as follows:—

"Now this (Mount Sinai) is the highest of all the mountains thereabouts, and the best for pasturage, the herbage there being good; and it had not been before fed upon, because of the opinion men had that God dwelt there, the shepherds not daring to ascend up to it."

This referred to the time when Moses took Jethro's flocks to the pastures at the base of Sinai. The same superstition pervaded that locality to the present moment. This bore out the remarks which Mr. Graham had made as to the permanence of tradition. He (Sir Samuel Baker) was himself a firm believer in the integrity of Eastern traditions. When Moses became Jethro's son-in-law, and had charge of Jethro's flocks, he wisely led them to Mount Sinai, where the pasturage was good, in consequence of other superstitious shepherds being afraid to go there. Moses, however, lived in this district forty years, during which time he acquired the geographical knowledge of the country which was afterwards most valuable in the exodus of the Israelites from Egypt; he must most probably have known the ford which had been mentioned as the point at which the Red Sea was crossed.

The Rev. Mr. HOLLAND, in reply, said he quite agreed with Mr. Cyril Graham, that in former times there was probably a very large number of trees compared with the present state of the peninsula; but at the same time he would observe that the destruction of the trees would not necessarily alter the general features of the country. He believed that, in its general features, the country was exactly the same as it was at the time of the Israelites. His chief reason for that opinion was that in the sandstone district there were Egyptian tablets of the date of the exodus, which were now in an almost perfect state of preservation. Sandstone was a much softer rock than granite, and he believed that those tablets could not have remained to the present time had the physical features of the country greatly altered. He could not claim the bilingual inscription as a discovery of his own. It had been known for some time, and Mr. Grey copied it. It had also been already published. Mr. Foster knew it, and spoke of it as an "evident superfetation of barbaric Greek."

He passed it over with those long words; but no one could have any doubt that the "barbaric Greek" was done by the same hand as the other inscriptions. The workmanship in both cases exactly corresponded. With regard to the ruins, Mr. Cyril Graham had said that the Nabaioths or the Nabatheans inhabited the country between the time of the Amalekites and the monastic occupation of the country. He (Mr. Holland) firmly believed that the Sinaitic inscriptions were the work of the *Nabatheans*, and that they established a mining or trading colony in the peninsula, making Serbal their centre. The ruins on the top of Serbal were probably those of their temple. As to the crossing of the Israelites over the Red Sea, one gentleman had spoken about "the author's theory;" but he (Mr. Holland) must declare that he had no theory whatever on the subject. He had read an immense number of theories, but he had never been able to get over the plain expression of a "wall of water on each side." He did not believe that any theory which had been raised would explain the formation of that wall of water. He would mention another interesting tradition, which he had heard in the peninsula,—the Arabs believed that the rainfall was regulated by the monks opening the book of Moses; and after the flood to which he had alluded in his paper, the Arabs remarked that the monks had opened the book too wide. They also informed him that they believed that the Pacha of Egypt regulated the rise of the Nile by opening and shutting the Book of Miriam. Probably the connexion of the name of Miriam with this tradition, as to the overflow of the Nile, arose from the fact of Miriam watching over her brother Moses when he was laid in the flags by the river's bank.

Mr. KENNELLY explained that when he spoke of "the author's theory," he merely alluded to his theory of the route of the Israelites after crossing the Red Sea, and not to any theory as to the place or manner of the crossing.

2. *A Visit to the North-East Coast of Labrador, during the Autumn of 1867, in H.M.S. 'Gannet.'* By Commander W. CHIMMO, R.N.

THE object of this voyage was to search for new fishing-grounds on the little-known Labrador coast, and to find harbours of refuge for the Newfoundland fishermen. The *Gannet* sailed from Halifax on July 31, 1867, and passed up the east coast of Nova Scotia to the beautiful harbour of Sydney. Hence, continuing northwards, she began to meet with icebergs on the 4th August, near Wreck Bay, in Newfoundland; the first seen was 80 feet high, perfectly white, except here and there streaks of ultramarine blue. Battle Harbour, on the coast of Labrador, was reached on the 5th. About 300 persons were found here engaged in the fishery; but the ice had been unusually thick this season, and only half-cargoes could be obtained. Passing Petty Harbour, Alexis and Gilbert rivers, the coast was picturesque but bare, and, when the north-wind died away, a mirage arose which distorted the land into most surprising shapes. Occasional Harbour was next visited, and some interesting information obtained about the capelin, a delicious fish peculiar to these latitudes. During succeeding days numerous fishing-vessels and busy people were seen in every cove and harbour; in some harbours

there were as many as 1000 boats. When off Round Island, the position of the most easterly point of Labrador was fixed by observation, and the longitude as given on charts, found to be in error, by 10" 30" too far east. In short, the result of the survey by the *Gannet* was to prove that the whole of the coast had been erroneously placed by previous imperfect surveys 10 or 11 miles too far to the eastward. In "Indian Tickle" Harbour, 126 cod-fish were taken by the officers of the ship in less than half an hour by hook and line, sometimes two fish by one line. The distance from "Cut-throat" to Webeck was found to be 44 miles; by the chart it was 27. Webeck was reached on the 8th of August, and surveyed during the following days. From the top of the island Commander Chimmo counted 52 large icebergs aground in the offing. After completing the survey of Webeck and Indian harbours, the ship, on the 20th August, proceeded northwards, having embarked an Esquimaux pilot named John Tooktooshner. Aillik, a Hudson Bay settlement, was next visited, and afterwards Hopedale, where there is a numerous settlement of Christianised Esquimaux. On the 23rd of August the survey of the harbour was commenced and finished on the 26th, in the midst of a north-westerly gale. Hopedale was the limit of the voyage northwards, and further observations of coast-line, soundings, and sailing directions were made in the return journey down the coast.

The paper will be published, with a chart of the coast, in the 'Journal,' vol. xxxviii.

ADDITIONAL NOTICES.

(Printed by order of Council.)

1. *Letter to Sir Roderick I. Murchison, on a Voyage to the North-East Coast of Greenland.* By DAVID GRAY, Esq.

"SIR,

"Peterhead, 22nd February, 1868.

"I have been much gratified by observing that the Royal Geographical Society has revived, with earnestness, the question of the propriety of organising an expedition with the view of reaching the North Pole. I think it is evident that the voice of the country will not permit the important geographical discoveries which such an expedition would undoubtedly effect, to be longer delayed; and that after so much has been done by British seamen to acquire the experience and information requisite for the successful conduct of such an expedition, it is a point of national honour that it should not be prosecuted otherwise than by their energies and exertions.

"As I am about to sail on a voyage to the Arctic Seas, and as the question

will no doubt receive farther discussion in my absence, I may be permitted to offer for consideration the views which much thought, and experience of many years of Arctic navigation have led me to entertain regarding the route by which, as it appears to me, the Pole may be most easily reached, with the greatest amount of economy and safety to the expedition which may be engaged in that service.

"The views of Capt. Sherard Osborn and the other distinguished navigators who have written and spoken on this subject, and who recommend Spitzbergen, Behring's Straits, and Baffin's Bay, as the three routes by which the Polar Sea may be reached, are entitled to every consideration and respect; but I humbly think that none of these possess the advantages of a fourth route, viz., by the East Coast of Greenland, which it is my purpose to advocate in this communication.

"Having for many years pursued the whale fishery on the East Coast of Greenland, and observed the tides, the set of the currents, and the state of the ice in that locality, at various seasons of the year, I think that little, if any, difficulty would be experienced in carrying a vessel in a single season to a very high latitude, if not to the Pole itself, by taking the ice at about the latitude of 75° , where generally exists a deep bight, sometimes running in a north-west direction upwards of 100 miles towards Shannon Island, from thence following the continent of Greenland as long as it was found to trend in the desired direction, and afterwards pushing northwards through the loose fields of ice, which I shall show may be expected to be found in that locality. The following are the reasons on which that opinion is founded:—

"1st. In prosecuting the whale fishery in the vicinity of Shannon Island, there are generally found loose fields of ice, with a considerable amount of open water, and a dark-water sky along the land to the northward; the land water sometimes extending for at least 50 miles to the eastward; and, in seasons when south-west winds prevail, the ice opens up very fast from the land in that latitude.

"2nd. From the comparative rarity of icebergs on the East Coast of Greenland, I conceive that I am justified in inferring that there does not exist any great extent of land to the northward; and if that inference is correct, I am led to the conclusion that there would be less difficulty in pushing a ship to the northward, than if there were comparatively narrow channels to be encountered, as is the case in the route by Smith's Sound.

"3rd. The ice on the East Coast of Greenland is what is termed field or floe ice, the extent of which varies with the nature of the season, but it is always in motion, even in winter, as is proved by the fact that ships beset as far north as 78° have driven down during the autumn and winter as far south as Cape Farewell. Thus there is always the means of pushing to the northward, by keeping to the land ice and watching favourable openings, without the risk of encountering the fast ice prevailing in Smith's Sound.

"4th. I have observed, on landing on Pendulum Island early in the month of August, that the rise and fall of the tide did not appear to exceed four feet. On that occasion, the land water extended 60 miles to the south-east, the ice in it being in such a condition that it was scarcely necessary to change the ship's course for it; and on ascending the highest of the Pendulum Islands—the altitude of which may be judged of from the fact that it can be seen from sea at a distance of upwards of 60 miles—the open water extended to the northward as far as the eye could reach, with a dark-water sky beyond.

"5th. The current generally sets in a south-west direction, and the drift of the ice, with moderate northerly or north-easterly winds, is from 8 to 10 miles a day, sometimes reaching, with a strong north-easterly gale, as much as 20 miles a day. South-west winds, on the other hand, have the effect of causing the ice to open out, leaving large open lanes between the pieces; and I have no

doubt the same effects would be felt to the farthest limit of the Greenland coast northwards.

"6th. In the event of an expedition prosecuting the route I have recommended, it would certainly, without difficulty, and with favourable winds in not more than fourteen days, reach Shannon Island, which would serve for a land base for its future operations, unless one were desired farther north, which could be obtained. Thus, supposing the expedition to sail in the early part of the month of June, it would reach the field of its operations in six weeks less time than it would take to reach the entrance of Smith's Sound; and, instead of having only a short time in the month of September available for its object if it went by the Smith's Sound route, it would have before it the greater part of the month of July, the month of August, and the half of September for its work, in which time its object might be accomplished.

"7th. Supposing it were necessary for the expedition to winter, there are apparently many bays and good harbours on the East Coast of Greenland available for that purpose; and, from the indications which I have observed, there seems to exist there an average amount of animal life compared with the other Arctic districts.

"It is desirable that, before the despatch of another Arctic expedition, as many views on the subject should be obtained as possible, and I trust that this may be accepted as my apology for troubling you with this communication.

"I have the honour to be, sir, your obedient servant,

"DAVID GRAY."

2. *Memorandum on the Comparative Progress of the Provinces now forming British Burma under British and Native Rule.* By Colonel ALBERT FYTCHE.

Rangoon, 23rd August, 1867.

BRITISH Burma affords means of drawing a fair comparison between British and Native administration, because it has in immediate contact with it, as a Government, the very power from whose dominions the province was obtained. In 1826 the provinces of Arakan and Tenasserim were annexed to the British territories from the Burmese power, still leaving to the King of Ava the whole of the northern portion of his dominions, as well as the important province of Pegu, formed of the lower portion of the valley of the Irrawaddy River, and its delta. We thus obtained possession of the least productive portion of the Burmese Kingdom, while the King retained the magnificent lands of Pegu, with the valuable outlet of Rangoon, to which point foreign trade had solely been drawn. A reference to the map will show that the province of Pegu was fairly interposed between the newly acquired districts, in a position easily to withdraw from them both population and trade, provided Native rule had proved more attractive to either. These conditions, then, seem to furnish a fair test—only that the presumption was in favour of the Native dynasty, in virtue of its holding a far richer and more accessible country.

In the East there is probably no better general test of the advancement of a country than the rise or fall, the ebb or flow of its population. A steady increase in the population indicates, in fact, a prosperous people, a firm and stable Government, and an absence of oppression. It produces, especially where the proportion is not in excess of the capabilities of the soil, extended cultivation and increased trade. If, then, it can be fairly shown that the population of the provinces composing British Burma has increased at a rate which far exceeds the numbers to be obtained from natural increase, and must be attributed to immigration; that in one instance, where the locality whence the immigration was drawn became British, the exodus ceased; while the flow

from Native states into British districts, more accessible, continued; and that, where detailed statistics are available, it will be seen our frontier districts have increased at the highest ratio, then we may conclude that British administration in Burma has proved its superiority over Native rule. In British Burma the population returns are fairly reliable, because they are susceptible of easy check from the capitation tax in force in these provinces. This tax is levied from all male adults, and the revenue received therefrom—actual money paid into the Treasury at fixed rates per head—has shown a proportional increase, corresponding with the rise in population.

It is well known that when Arakan and Tenasserim first came into our possession, in 1826, they were almost depopulated, and were so unproductive that it was seriously deliberated whether they should not be restored to Burma. The following figures will show how much these apparently unprofitable acquisitions prospered under our administration.

In 1826 the province of Arakan, with an area of 18,630 square miles, had a population of only 100,000 souls; these were the indigenous population. In 1835 this had risen to 211,536, of whom not more than 6000 were foreigners. In 1845 the population numbered 309,608, an increase of 50 per cent. in the decade, and in 1855 reached 366,310, or 15 per cent. in the decade, but in 1852 Pegu had become a British possession, the effect of which was immediately felt in Arakan; still the total increase in Arakan, during the twenty-nine years, was 250 per cent. of the indigenous population, or an average of 50 per cent. in each decade.

Now turning to Tenasserim, we find that in 1829, three years after the annexation, the population in a province with an area of 28,000 square miles was estimated at a little over 70,000 souls. In 1835 it had risen to 84,917, or 21 per cent. in six years. In 1845 to 127,455, or 50 per cent. in the decade. In 1855 to 213,692, or 69 per cent. in the decade. In other words, it had increased by 200 per cent. in twenty-six years. The actual increase in the home population of England and Wales (after the loss from emigration) has been about 12 per cent., in each decade of the last fifty years.

To support the above returns, we will give the statistics of revenue and assessed cultivation during the same period. The revenue of Arakan, which in 1826 was 23,225*l.*, rose as follows:—In 1835 to 52,832*l.*; in 1845 to 68,455; and in 1855 to 127,729*l.* The area of assessed cultivation, commencing in 1830 with 66,227 acres, advanced in 1835 to 133,952; in 1845 to 233,769; and in 1855 to 353,885 acres, while the value of the entire trade in the same year amounted to 1,876,998*l.* In Tenasserim the first year's revenue in 1825-6 was 2,676*l.* In 1835-6 it had risen to 33,953*l.* In 1845-6, 52,525*l.*, and in 1855-6 had reached 83,300*l.*; while the total trade amounted to 836,305*l.* Land under cultivation was not assessed by area in the earlier years of our occupation, and we have no returns on that head until 1843, when 100,657 acres were assessed. This in 1845 had increased to 119,869, and in 1855-6 to 181,681.

Now from 1826 until 1852 the provinces of Arakan and Tenasserim had as a competitor, both for trade and population, the Burman territories with a frontier of some 800 miles, across which our subjects were free to go, as far as we were concerned; but not free to come, because the Burman authorities strongly opposed emigration, and put serious obstacles in the way of any of their people migrating to our territories. Yet the immense increase of population shows that very large numbers were attracted to our rule.

Pegu came into our possession in 1852, with an estimated population of 500,000 souls, and an area of 33,400 square miles, or a ratio of 15 persons to the square mile. In 1855 it is returned at 631,640 souls, or nearly 19 to the square mile. It will be remembered that Arakan, commencing in 1826 with a ratio of 5½ persons to the square mile, had risen in 1855 to a ratio of 20

persons; and Tenasserim, from a ratio of $2\frac{1}{2}$ persons in 1829, had increased to 7 persons per square mile in 1855. But it would seem that in the beginning of the century the population of the true Burman Empire (that is Upper Burma, as now constituted, Pegu and Martaban) was estimated by various authorities at from 20 to 23 persons the square mile; and if this were the general average, it may be concluded that the fertile province of Pegu, containing the valley of the Irrawaddy, with that river as the highway from the seaport town of Rangoon to Ava, the capital of the empire, must have had a higher rate than the remainder of the country. But taking the population of Pegu at 23 persons to the square mile in 1826, we can then compare the position of the territories, British and Native, after 29 years of mutual contact, thus:—

		1826.		1855.	
		Population.		Population.	
Native	.. .. Pegu	769,120	...	719,640	
British	.. .. {Arakan	100,000	...	341,310*	
	.. .. {Tenasserim	70,000	...	213,692	
Total		939,120	...	1,274,642	

Now we know that the gross increase in Arakan and Tenasserim in these 29 years was 885,000 souls, from which—allowing the natural increase during that period to have been 75 per cent. on the original population—we may deduct 127,500 on that account, and this will leave us 257,500 souls as the emigration from Pegu and the other native Burman states into British territory; and if we compare Pegu (including Martaban) fairly estimated in 1826 with Pegu (including Martaban) even in 1855 (three years after it came into our possession, during which period its population is believed to have risen from 588,000 to 719,640), we find it with nearly 50,000 less population at the latter than at the former period. This is an astonishing result, when placed against the immense progress of the British territories in its immediate neighbourhood.

Having thus brought up these provinces to 1855, we shall now trace their progress since that period. The province of Pegu, as has been said, came into our possession in 1852; but making allowances for the distressed condition of a country after a campaign, and for the imperfect returns incidental to a newly organised administration, we may pass over the years up to 1855, and from that date commence our deductions.

Now, as to the province of Pegu: it faces, with a perfectly open frontier of (say) 200 miles, the still existing Burmese territories under the King of Ava, so that it is fairly pitted against the possibly superior attractions of Native rule. From our territories any subject of ours is free to move into Upper Burma whenever he desires, whereas there is a steady opposition shown to any emigration from the King's dominions into ours. So strong is this that when families of cultivators wish to cross they are frequently obliged to do so by stealth at night, bringing possibly their cattle and carts, but abandoning their houses and much property. In the face of these difficulties, we find that Pegu, first a separate province, now a division of British Burma, had in 1855 a population of 631,640 souls, which in 1865 had risen to 1,350,989. That is, more than doubled itself in ten years,—the exact increase being 113 per cent. The proportion of population to area had increased from 19 to 40 per square mile. If we allow a natural increase of 25 per cent. during the decade in question, we may deduct 157,910 on that account; and 20,000, the number of foreigners, from 719,349, which is the total gross increase; and these deductions will leave us an immigration of the indige-

* Not including foreigners.

nous population into our territories of the enormous number of 561,439 souls in the ten years from 1855 to 1865.

The foregoing data seem to establish, beyond any doubt, that during the whole period of British administration of the provinces of Arakan, Tenasserim, and Pegu, they have, in addition to an allowed natural increase of population far higher than we have any historical authority for supposing they ever reached under Native rule, withdrawn and absorbed enormous numbers of people from the neighbouring Native states, which may be summarized as follows:—

Into Tenasserim and Arakan, 1826 to 1855	..	..	..	257,500
„ Pegu, from 1855 to 1865	..	..	..	561,439
„ Tenasserim, from 1855 to 1865	..	..	..	113,295
Total	..	..	..	932,234

And when we look to those Native powers which have been our competitors during this period the picture is reversed. In the dominions of the King of Burma, including the tributary Shan States, we find everywhere signs of progressive decay; a discontented people abandoning his territory; a decreasing revenue; the area of cultivation lessening yearly; and the weakness of the Government shown in the rebellions and outbreaks which so regularly occur. During this year (1867), had it not been for the rich granaries of Pegu that supplied Upper Burma with rice, a famine would have succeeded the civil war which raged last year. The natives of Upper Burma themselves indicate truly the process now being undergone by the British and Native dominions. “Here,” they say, “in British Burma your villages are becoming towns, but with us in Upper Burma our towns are becoming villages.”

3. *Extract from a Letter from Captain Cadell, commanding the South Australian Exploring Expedition on the North Coast of Australia.*

(Communicated by F. S. DUTTON, Esq., F.R.G.S.)

“South Australian Exploring Steamer *Eagle*,
Coepang, Timor, 27th Nov., 1867.

“I LAST wrote from Burke Town. I have since made some rather important discoveries, of which the principal are, viz.: the discovery of the mouth of the Roper, in lat. $14^{\circ} 45' \text{ s.}$ It is a noble river, fully up to Leichhardt’s description; and good pastoral country will be found on its banks,—the best, indeed, I know of in the northern territory. Proceeding northwards, a moderate sized river flows into the gulf, in lat. $14^{\circ} 27' \text{ s.}$; whilst a smaller was met with in lat. $14^{\circ} 5' \text{ s.}$ A fine haven, with an area of some 50 square miles, and several rivulets; also one moderate sized river flowing into it was entered in lat. $12^{\circ} 33' \text{ s.}$ and long. $136^{\circ} 55' \text{ E.}$

“Immediately to the northward of Probable Island, near Arnhem’s Bay, represented by Flinders, under the most pardonable conditions, as dry land, I sailed up a deep bay 20 miles in depth by 10 in breadth, with *three* large rivers disemboгуing their waters therein. The *Eagle* entered one with 5 fathoms on the bar. Another, with an equal depth, was thoroughly examined by the boats. This bay, which I propose to name after his Grace the Secretary for the Colonies, is separated from the strait I had previously discovered by a narrow peninsula. On the north coast a fine river, with a remarkably easy entrance, was found betwixt Points Guion and Turner. Three low dangerous rocks, in the very closest proximity to which Flinders unwittingly passed in the night, are situated in a N.E. by N. $\frac{1}{2}$ N. bearing from Cape Arnhem, distance 13 miles. I purpose naming them after Sir Roderick,

appropriately the patron saint of any geographical discovery. Some minor dangers, &c., have also been charted during the progress of the expedition. We have been rather debilitated lately; however, the surgeon reports the sick to be improving rapidly on the first supplies obtained here.

"After my examination of the coasts of the northern territory, I am decidedly of opinion that the estuary of the Liverpool offers by far the best site for its capital, and will recommend it accordingly. I am also of opinion that Finniss' preference to Adam Bay over the Victoria was a wise one. The river is rapid and dangerous; whilst the country situated on the navigable portion of its waters is of the most wretched, stony, and barren description, with the heat intense, causing the expedition to suffer more than during any period of its explorations.

"I feel convinced of the possibility of executing the necessary surveys for the 300,000 acres during the good season of the south-east monsoon of 1868. Everything at Escape Cliffs was found in exactly the same order as it was when abandoned. The natives actually had touched neither the buildings nor any of their contents. They had permitted even the bananas to rot on the trees rather than take them. They reported the stock to be doing well, and they themselves were very friendly during our short sojourn. We have never had the slightest animosity from the north territory Aborigines, but the greatest assistance in procuring fuel and water has generally been afforded by them. I must now close, as the ship is ready and steam up."

PRIZE MEDALS

OF THE

ROYAL GEOGRAPHICAL SOCIETY.

THE Council of the Royal Geographical Society, in pursuance of the intention expressed in their Annual Report, May, 1868, have invited the following 37 Schools, containing in the aggregate about 12,700 boys, to compete, in 1869, for their Annual Prize Medals.

List of Schools invited to compete, in 1869, for the Medals of the
ROYAL GEOGRAPHICAL SOCIETY.

*English Schools.**—Birmingham, King Edward's School; Brighton College; Cheltenham College; Clifton College; Dulwich College; Eton College; Greenwich, Royal Naval School; Haileybury College; Harrow; Hurstpierpoint; Liverpool College; *London*,—Charter House, Christ's Hospital, City of London School, King's College School, Merchant Taylors', St. Paul's, University College School, and Westminster;—Manchester School; Marlborough College; Repton; Rossall; Rugby; Shoreham; Shrewsbury; Uppingham; Wellington College; Winchester.

Scotch Schools.—Aberdeen Grammar School; Edinburgh Academy; Edinburgh High School; Glasgow High School.

Irish Schools.—Ennis College; Enniskillen Royal School; Dungannon Royal School; Rathfarnham, St. Columba's College.

The following Circular Letter has been sent to the Head Masters of the invited Schools:—

Royal Geographical Society, 15, Whitehall Place, London, S.W.

SIR,—By order of the President and Council I have the honour to inform you that the Royal Geographical Society propose to encourage the study of Geography in Great Britain, by the offer of prizes for general competition among the boys of the principal Schools, as indicated in the accompanying list.

The Royal Geographical Society offer two Medals of Gold, and two of Bronze, one of each to successful Candidates in an annual Examination in Political Geography and in Physical Geography respectively. The Society will also publish the names of such other boys as may have eminently distinguished themselves in the Examinations.

The Examination will take place on the first Monday in May, 1869, and will be repeated in each succeeding year until further notice.

The Examination will be conducted by means of sealed papers of questions,

* These include the nine Schools of the Royal Commission of 1864, and all others that, according to the latest edition (1866) of the 'Public School Calendar,' contain not less than 200 boys.

sent simultaneously to the invited Schools. A copy of the several forms to be used in connexion with the Examination, is appended to this letter.

The only limitations in respect to the competition are as follow:—

Four boys *only* in each of the invited Schools can be admitted to the Examination in Political Geography, and the same number to that in Physical Geography.

No boy can compete in both subjects in the same year.

A Medallist may not again compete for the same Medal.

The President and Council will be glad to be informed whether any boys from the School over which you preside, are likely to compete. They will give due consideration to any remarks or suggestions you may think proper to make in reference to the Examinations of future years.

I am, Sir, your obedient servant,

H. W. BATES,

Assistant Secretary.

To the Head Master of ——— School.

Forms used in the Examinations of the ROYAL GEOGRAPHICAL SOCIETY.

FORM No. 1.

Royal Geographical Society, 15, Whitehall Place, London, S.W.

SIR,—I beg to remind you that the School over which you preside is among those invited by the Royal Geographical Society to compete for their annual Medals, as is stated in the list, a copy of which you will already have received.

The number of Candidates from your School is strictly limited to four in Political and to four in Physical Geography. No boy can compete in the same year for both subjects.

The Examinations will take place simultaneously at the several Schools on the first Monday in May (viz. May ———, 18—), between the hours of 9 and 12 A.M., and 2 and 5 P.M., by means of papers of questions, to be hereafter sent under seal to you and to the Head Masters of the other invited Schools.

If any among your scholars, subject to the above limitations in respect of number, desire to accept the invitation of the Royal Geographical Society, I beg you will send me a list of their names, ages, residences when at home, and the subject—whether Political or Physical Geography—in which they severally desire to compete.

It will be essential to their admission to the competition, that you should send me this return not later than April ———.

I am, Sir, your obedient servant,

H. W. BATES,

Assistant Secretary.

FORM No. 2.

LETTER OF INSTRUCTIONS.

Royal Geographical Society, 15, Whitehall Place, London, S.W.

SIR,—I beg to inform you that the papers for the ensuing Examinations in Geography will be forwarded by post on ———, the ——— day of ———, in a parcel addressed to you at ———.

You will have the goodness to let me know by post, or by telegraph if necessary, if the parcel is not duly delivered to you on the following morning, so that I may, if required, send duplicate papers in time for the Examination.

The outer wrapper of this parcel should be opened as soon as it is received, when you will find the papers for the morning and the evening enclosed in separate envelopes. The seal of each separate envelope is to be broken in the presence of the assembled Candidates, at the commencement of the time appointed for the Examination. This direction, as well as the *order* and *hours* prescribed for the examination, must be *strictly* observed.

There must be neither globe, map, nor any other geographical illustration in the room where the examination is held.

Writing-paper of foolscap size, blotting-paper, twine or tape, and pens and ink should be provided for the use of the Candidates.

Three hours *only* are allowed for each paper.

All writing must cease at the end of three hours to a *moment*, notice of the time having been given to the Candidates ten minutes previously.

At the appointed hour the papers should be collected; those on each subject separately. One Master at least must be present during the whole time assigned to each paper, and it will be his duty to expel any Candidate who shall be guilty of unfair dealing in the Examination. I beg to invite your careful attention to the accompanying "Advice to Candidates" and to the terms of the "Form of Declaration" to be sent with the papers, which will have to be signed by *all* the Masters present during the working of the several papers. After the Declaration has been filled up and signed, it should be tied up with the papers, and the whole should be sealed up and forwarded to me.

This must be done separately for the papers both morning and afternoon.

The Council of the Royal Geographical Society implicitly rely on your honour and judgment to enforce these regulations with scrupulous care, and to adopt the most effectual precautions against the possibility of communication between Candidates in the Examination-room, or any other irregularity.

I am, Sir, your obedient servant,

H. W. BATES,

Assistant Secretary.

FORM No. 3.

ADVICE TO CANDIDATES.

When the paper is given to you, *first* look to the instructions printed at the head of it, and *then* read the questions carefully over, marking those which you think you can answer best. Do them first, and, if any time remains, you may try some of the others; but do not exceed the number of questions appointed to be answered. Remember that a few accurate and sensible answers will gain a higher number of marks than a great number of indifferent attempts.

Write your full Christian and surname at the head of the first page, and your surname, at least, at the head of all the others.

Write *legibly* and *neatly*, leaving a margin unwritten upon.

Write only on one side of the page.

As far as possible, avoid prolixity in your answers.

As soon as notice is given (ten minutes before the end of the time) finish your papers, see that they are numbered rightly, and paged in their proper order. Fasten them with twine or tape at the upper left-hand corner, and leave them *unfolded* at your seat.

CAUTION.

Any Candidate attempting to take unfair advantages: such, for example, as having in his possession *any* book or written paper, or seeking or receiving assistance from another, will be immediately expelled from the Examination.

No Candidate may speak to another Candidate, on any pretence whatever, under pain of expulsion.

Whoever gives assistance will be treated in the same manner as he who receives or asks for it.

FORM No. 4.

DECLARATION.

School of _____.

We, the undersigned, hereby declare that the papers on _____ Geography, which are forwarded herewith, were worked, in our presence, by the — Candidates whose names they respectively bear, without any assistance whatever from books, notes, or memoranda, from each other, from ourselves, or any other person, and that there was no globe, map, nor other geographical illustration in the room where they were written. We declare that all the other regulations contained in the Letter of Instructions were faithfully observed, and that we were present uninterruptedly during the whole of the time respectively specified after our names.

Name, designation, and address
of Masters of the School who were
present during the working of the
papers referred to in the above Decla-
ration.

}	A. B., &c., from	to	.
	C. D., &c., from	to	.

N.B.—*The Masters of the School will appreciate the importance of this Declaration. The strict observance of the conditions prescribed by the Royal Geographical Society in their "Letter of Instructions" and "Advice to Candidates," is essential to secure equal justice to the several competitors.*

Syllabus of Examinations for the Prize Medals of the ROYAL GEOGRAPHICAL SOCIETY.

EXAMINATION IN POLITICAL GEOGRAPHY.

This Examination will take place simultaneously at the several invited Schools, according to the printed regulations, on the first Monday in May, 1869, and will consist of two papers of three hours each; the one to be answered between 9 and 12 A.M., and the other between 2 and 5 P.M.

No. 1 Examination Paper will consist of questions on the following subjects:—

A. Descriptive Geography.—The nature of latitude and longitude. What are the distances, speaking roughly, and as learnt by the careful study of a globe, between such remote places as may be specified? What places of importance lie on the direct way between them? What is the relative size, speaking roughly, of such well-known countries, mountains, and rivers, as may be specified?

Three or more "Aspects of Nature" named in the following list will be selected, and the Candidates will be required to describe their geographical features, especially in their relation to human wants and manner of life, illustrating their answers by special examples. *List of Selected Aspects of Nature*:—jungle; pine-forest; tropical forest; llanos; bush in South

Africa; scrub in Australia; moor; fen; bog; lagoon; mangrove-swamp; large river in temperate zone; large river in tropics; periodical river in arid country; delta; large fresh-water lake; large salt-water lake; alluvial plain; savannah; desert; stony desert; high mountain chain; glacier; moraine, ancient and modern; plateau; steppe; Polar scenery; coral island; volcano.

Extra marks will be allowed for sketches, but only so far as they are effective illustrations of what cannot otherwise be easily expressed. No encouragement will be given to artistic merit, *per se*.

B. Historical Geography.—Embracing (1) the boundaries of states and empires at different historical periods; (2) the chief lines of commerce, ancient and modern; (3) the topography of great capitals; (4) the influence of geographical features and conditions upon the distribution of races and political history of mankind.

No. 2 Examination Paper will consist wholly of questions on special subjects.

The special subjects appointed for 1869 are:—

A. Geography of Palestine, descriptive and historical.

B. Geography of Plants useful to Man, considered with reference to the conditions of growth, to the distribution, and to the applications of the plants and their products named in the following selected list:—*Cereals*—wheat; barley; rye; oats; maize; rice; doora. *Other Farinaceous Plants*—sago-palm; mandioca; potato; yams. *Fruits*—date; banana; bread-fruit; grape; orange; cocoa-nut. *Textiles*—cotton; flax; hemp; jute. *Oils*—olive; palm. *Sugar-producing Plants*—cane; beet-root; date; maple. *Spices and Stimulants*—tobacco; pepper; tea; coffee; chocolate; maté. *Gums and Resins*—the various kinds of India-rubber; gutta percha.

EXAMINATION IN PHYSICAL GEOGRAPHY.

This Examination will take place simultaneously at the several invited Schools, at the same hours and under precisely the same regulations as those in Political Geography.

No. 1 Examination Paper will consist of questions on the following subjects:—

A. Configuration of the Earth, as learnt by careful study of a globe. What are the distances, speaking roughly, between such remote places as may be specified? What places of importance lie on the direct way between them, and what is the section along it? What is the relative size, elevation, &c., speaking roughly, of such well-known districts, mountains, and rivers, as may be specified?

B. Selected Aspects of Nature.—Three or more of the aspects of Nature named in the following list will be selected, and the Candidates will be required to answer questions upon their physical characteristics, and the theory of those characteristics, illustrating their answers by special examples. *List.*—Chief mountain-forms; glaciers and moraines; volcanoes; deserts, sandy and stony; mines; gold-fields; lakes, fresh and salt; phenomena of Polar regions, rivers, river-basins and watersheds.

Extra marks will be allowed for sketches, but only so far as they are effective illustrations of what cannot otherwise be easily expressed. No encouragement will be given to artistic merit, *per se*.

C. *General Physical Geography*.—Prominent features of the distribution of climate, rain, winds, ocean currents, minerals, vegetation and animal life, magnetism.

No. 2 Examination Paper will consist wholly of questions on special subjects.

The special subjects appointed for 1869 are :—

A. *Physical Geography of Palestine*.

B. *The Physical Geography of the Mediterranean Sea, and of its basin*.

PROCEEDINGS
OF
THE ROYAL GEOGRAPHICAL SOCIETY.

[ISSUED JULY 15TH, 1868.]

SESSION 1867-8.

Twelfth Meeting (ANNIVERSARY), 1 P.M., *May 25th*, 1868.

SIR RODERICK I. MURCHISON, BART., K.C.B., PRESIDENT, in
the Chair.

THE Secretary, Mr. R. H. Major, read the Rules for the conduct of the Anniversary Meetings of the Society and the Minutes of the last Annual Meeting. The President then nominated, as Scrutineers of the Ballot, Charles White, Esq., J.P., and Dr. Webster.

The following new Fellows were elected :—William Dell, Esq. ; J. S. A. Dunbar, Esq. ; the Hon. Anthony Forster ; Sir Francis Goldsmid, Bart. ; Rev. William Green, M.A. ; Lieutenant-Colonel William Gray, M.P. ; Captain Henry M. Jones, V.C., &c. ; Daniel M. Kisch, Esq. ; Francis D. Lambert, Esq. ; George William Nicol, Esq.

The Report of the Council was then read, and its adoption put to the Meeting and carried,

PROFESSOR W. HUGHES, of King's College, asked permission to express the extreme gratification with which, as an old Fellow of the Society, he had listened to the passages in the Report relating to the offer of Prizes for Geography to the chief public schools. He felt grateful to the Council for this additional encouragement to the cause of geographical education. Few had more reason than himself to know how much the study of geography needed such encouragement in our schools and colleges. As a teacher of geography during upwards of a quarter of a century, he was perfectly convinced that we should never, in our high-class institutions, have a due regard

paid to this subject until we had some such direct encouragement as that which the Council of the Geographical Society proposed to offer.

The PRESIDENT then proceeded to deliver the Royal Medals for the encouragement of geographical science and discovery. The FOUNDER'S MEDAL to Dr. A. PETERMANN, of Gotha, for his important services as a writer and cartographer in advancing the science, and for his well-known publication, the '*Geographische Mittheilungen*,' which for twelve years has greatly aided the progress of geography. The PATRON'S GOLD MEDAL to Mr. GERHARD ROHLFS, for his extensive travels in the interior of Northern Africa, and especially for the great journey in which he traversed the continent from Tripoli to Lagos, in the Gulf of Guinea. A gold watch was also awarded to the Pundit employed by Captain T. G. Montgomerie for the route-survey made from Lake Manasarowar to Lhasa, in Great Thibet. Dr. Petermann received both medals, replying for himself and M. Gerhard Rohlfs, who is now in Abyssinia. The Pundit was represented by Viscount Strangford, who received the watch and replied in his behalf.

The sum of Five Pounds was presented to Mr. W. J. WILSON, being the annual prize for geography offered by the Society in the Society of Arts' Examination. Mr. Wilson was presented by Mr. Le Neve Foster, Secretary of the Society of Arts.

On the motion of Admiral Sir GEORGE BACK, seconded by T. H. BROOKING, Esq., the following alteration was ordered to be made in the Regulations, whereby Fellows in future will be restricted, in consequence of the want of space, to the admission of one friend only at the evening Meetings:—

“That the last two lines of Article II., Section iii., Chapter 5, of the Regulations be omitted: viz., ‘but should a Fellow desire to introduce a second [visitor], he can do so by applying to the Secretary for a special card of admission.’”

The following Resolution on the subject of a portion of the premises (stables) leased by the Society, which have been taken by the Waterloo and Whitehall Railway Company, was proposed by A. G. FINDLAY, Esq., seconded by W. BOLLAERT, Esq., and adopted by the Meeting:—

“That the arrangement entered into between the Trustees of the Royal Geographical Society and the Waterloo and White-

hall Railway Company, whereby the purchase-money for the sale to the said Company by this Society of certain leasehold hereditaments, situate in Great Scotland Yard, in the parish of St. Martin-in-the-Fields, in the county of Middlesex, and held in trust for this Society (and which Premises are required for the purposes of the Waterloo and Whitehall Railway, and are numbered 10 in the Parliamentary Plan and Book of Reference of the said Railway deposited in the Office of the Clerk of the Peace for the county of Middlesex), was determined at the price or sum of 150*l.*, be and the same is hereby approved and concurred in by this Meeting; and that the Council be and are hereby authorised to carry such arrangement into effect, and to complete the said sale, and to affix the seal of this Society to the Assignment of the said Premises."

The PRESIDENT then delivered his Annual Address on the progress of geography. At its termination, Admiral R. COLLINSON proposed a vote of thanks to the President, with a request that he would allow the Address to be printed. The motion was seconded by C. WHITE, Esq., and carried unanimously by the Meeting.

At 3 P.M. the result of the Ballot for the President and officers of the ensuing year was reported by the Scrutineers.

¶ The following gentlemen were declared elected: the names in italics being those of the new Committee, and those who change office:—*President*: Sir Roderick Impey Murchison, Bart., K.C.B., F.R.S., &c. *Vice-President*: Vice-Admiral Sir G. Back, D.C.L., F.R.S.; Francis Galton, Esq., M.A., F.R.S.; *Viscount Strangford*; Major-General Sir A. Scott Waugh, F.R.S. *Trustees*: Lord Houghton; Sir Walter C. Trevelyan, Bart. *Secretaries*: Clements R. Markham, Esq., F.S.A.; R. H. Major, Esq., F.S.A. *Foreign Secretary*: Cyril C. Graham, Esq. *Council*: Right Hon. H. U. Addington; John Arrowsmith, Esq., F.R.A.S.; Major-General G. Balfour, C.B., R.A.; Sir Samuel Baker; Thomas H. Brooking, Esq.; *Rear-Admiral R. Collinson*, C.B.; James Fergusson, Esq., F.R.S.; A. G. Findlay, Esq.; Right Hon. Sir Thomas F. Fremantle, Bart.; *Sir H. Bartle Frere*, K.C.B.; *Captain E. A. Inglefield*, R.N., F.R.S.; Captain Felix Jones (late I.N.); Herman Merivale, Esq., C.B.; Captain Sherard Osborn, R.N., C.B.; Captain George H. Richards, R.N.; *Major-General C. P. Rigby*, C.B.; *Major-General Sir Henry C. Rawlinson*, K.C.B., M.P.; Sir Charles Nicholson,

Bart.; Thomas Thomson, Esq., M.D., F.R.S.; *Lord Wharncliffe*; *Sir Harry C. Verney, Bart.*, M.P. *Treasurer*: Reginald T. Cocks, Esq.

A vote of thanks to the retiring Vice-President, members of Council and Committees, and to the Auditors and Scrutineers, was proposed by Keith Johnston, Esq., and seconded by F. Trestrail, Esq., after which the Meeting separated.

PRESENTATION

OF THE

ROYAL AWARDS.

(At the Anniversary Meeting, May 25, 1868.)

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THE Founder's Gold Medal is awarded to Dr. AUGUSTUS PETERMANN, for his important services as a Writer and Cartographer in advancing our Science, and for his well-known publication the 'Geographische Mittheilungen,' which for twelve years has greatly aided the progress of Geography. The Patron's Gold Medal to M. GERHARD ROHLFS, for his extensive travels in the interior of Northern Africa, and especially for the great journey in which he traversed the continent from Tripoli to Lagos in the Gulf of Guinea.

In presenting the Founder's Medal to Dr. Petermann, the PRESIDENT addressed him in the following words:—

“Dr. PETERMANN,—

“The terms of the award of a gold medal, as approved by the Council, express in brief outline your deserts as a geographer. I need scarcely say that in this decision I heartily concur. The spirit and ability with which you have so successfully conducted for the last twelve years the publication of the 'Mittheilungen' have called forth our entire approbation, and have aided the diffusion of a taste for scientific geography throughout all civilised countries. For, whilst popularising the science by the continuous issue of clear explanatory maps and highly interesting memoirs, you have striven to give it a wider scope, by connecting it with various collateral branches of knowledge, thus rendering it a grand and comprehensive study.

“The zeal you have displayed in promoting the researches of travellers in distant lands, and the hearty manner in which you have appealed to the public for aid to enable them to carry out their plans, are well known to every reader of the 'Mittheilungen.' In proof of this commendable feature in your career, I may especially advert to your fostering care of Gerhard Rohlfs, your brother Medallist of this day, and your advocacy of the claims of Carl Mauch, on whose adventurous travels in Southern Africa I

am about to dwell in my Address. The accuracy with which you so rapidly brought out the results of the recent British explorations in Abyssinia have been highly appreciated by us.

“I must also specially advert to the steady enthusiasm with which you have laboured in the cause of North Polar exploration, until at length you have succeeded in exciting the maritime enterprise of your countrymen in this direction, and have, at your own risk and with your small means, actually raised a sum sufficient to send a Norwegian yacht to the North-east coast of Greenland. Your long-continued studies of Arctic and Antarctic Geography,—including highly instructive maps, representing the comparative amount of exploration towards either Pole, and the physical conditions which determine the currents and temperature of high latitudes, as bearing upon the routes to be followed in attempting to reach the North Pole,—I may truly say, give you another strong claim to our acknowledgment.

“For these substantial reasons, I welcome you once more back to England, and have the sincerest pleasure in presenting you with the Founder's Medal.”

Again addressing Dr. Petermann, the recipient of the Patron's Medal on behalf of M. Gerhard Rohlfs, the PRESIDENT thus spoke ;—

“In awarding the Patron's Gold Medal to your intrepid countryman M. Gerhard Rohlfs, of Bremen, the Council and myself have been moved by the self-sacrifice and disinterestedness with which this young traveller applied himself to his task, as well as by the extent and importance of the journeys he has accomplished. Commencing in 1861, Gerhard Rohlfs continued for five years exploring the northern part of the African continent. His journeys in Morocco in 1863-4 are the most important that any European has performed, and, in crossing the Atlas southward to the oases of Tuat and Tidikelt, he reached a point farther than was attained by any of the French explorers. On returning *viâ* Ghadames and Tripoli, he made a short visit to Germany, and went back to Africa with the noble purpose of penetrating to Waday, to recover the lost papers of his unfortunate predecessor in bold adventure, Dr. Vogel. Entering at Tripoli he reached Kúka, on the shores of Lake Chád; whence, prevented by the Sultan of Waday from entering his territory, he pushed southwards, and, reaching the Benuwe River at its upper course, followed it to the Niger, and travelled onward by land across the Yoriba country to Lagos in the Gulf of Guinea. All these great

undertakings were performed with means so slender as to excite admiration of the hardihood of the man who could undergo so much privation in the cause of science. In his great Morocco journey he travelled for eighteen months at a cost of 80*l*. Fortunately his patriotism and love of science carried him forward, and on his last expedition he was assisted by subscriptions raised in his native town of Bremen and in Berlin, as well as by a contribution of 100*l*. granted by our Society. Since his return the King of Prussia has acceded to his request, to send to the Sultan of Bornu, who protected the traveller whilst in the region of Lake Chád, a royal present, consisting of a new throne, a state-carriage, and a gold watch.

“At the close of our last session, Gerhard Rohlfs visited England on his return from Africa, with his faithful Moorish attendant, and delighted us by his lively description of the wild countries he had traversed, and the difficulties he had surmounted. The scientific results of his journeys have been elaborated by yourself, and published by you, together with the narrative of his travels.

“A traveller so courageous and devoted has well earned this mark of our approval; and it is with pride and pleasure that I deliver to you, who have been his best supporter, the Patron's or Victoria Medal, to be placed in his hands.”

Dr. Petermann, having received both medals, replied as follows:—

“SIR,—I receive these Medals with the deepest gratitude. There can be no higher reward to a devoted servant in Geographical Science, no better stimulus to further efforts, than this distinguished mark of approbation of the leading Geographical Society of the world.

“That I have come here to receive these Medals at your own hands, is a living proof how highly I value your approbation and kindness.

“I consider, Sir, that I have done no more than my duty, in endeavouring to add my mite to the stock of geographical knowledge. As, nevertheless, you have done me the great honour to bestow on me your award, I must confess that I owe it in great part to yourself and the Society. For, when I first came to England, 23 years ago, I experienced such kindness among my brother Geographers in this country, that I shall never forget it to the end of my life. And when afterwards, 14 years ago, I followed a call to my own country, I tried to second your noble efforts, and to labour along with you as well as I could. In these endeavours I have at all times been most kindly and liberally assisted by yourself and many British geographers and British authorities all over the world, while I have found in the enterprising geographical



establishment of Justus Perthes a suitable sphere of activity, and in my assistant and friend, Dr. Ernest Behm, a hearty co-operator in everything that tends to advance geographical knowledge. Ours is a laborious and tedious work; and, whilst you English are pre-eminently discovering and exploring in all quarters of the globe, we Germans chiefly try to make ourselves useful in the study at home, assisting to digest the information obtained.

"I accept with sincere pleasure the second Medal for my friend Gerhard Rohlfs, an honest and persevering traveller, who, kindly assisted by your Society, has done some good work.

"In his name and my own I offer you, Sir, the Council, and the Members of this great Society, our sincerest thanks. At the same time I cannot but consider it as a national honour; and I am sure that millions of my countrymen will read with pleasure the kind words you have spoken on this occasion.

"To receive these high rewards is a new proof that Science is not bounded by the limits of nations; but that its cultivators all over the world are one united brotherhood. Geography is the most universal of human inquiries. They cannot make war, they cannot make peace without Geographers. They cannot build a railway or lay out a ship's track without maps or surveys, or have trade and commerce without geography; our explorers must find out the gold-fields of the world; and not even a holiday-tour to Switzerland, or elsewhere, can be fully enjoyed without a good map. In fact, Geography is a great pioneer of culture and progress; and, moreover, the privations, hardships, and trials our travellers and explorers have to undergo, are an excellent school for bringing out the good qualities and forming fine characters.

"Having had the honour to be a Member of the Royal Geographical Society for a quarter of a century, I have witnessed with great gratification and admiration its rise, its present eminent position, its prospering condition, and extensive influence; and, while it is a great happiness for me to be once more among you, my hope and great wish is that the Society will advance and become more prosperous than ever."

A Gold Watch, value thirty guineas, awarded to the Pundit employed by Captain Montgomerie, for his route-survey from Manasrowar to Lhasa in Great Thibet, was next presented to Lord Strangford on behalf of the Pundit, now in India.

In presenting the watch, the President spoke as follows:—

"MY LORD,

"I have sincere gratification in placing in your hands this handsome gold watch, which the Council have awarded to that skilful Pundit whose remarkable travels in Thibet will shortly be published in our Journal. In requesting you, at the commencement of this day's proceedings, to receive this reward on behalf of the Pundit,

your Lordship stated that Sir Henry Rawlinson was the most fitting person to perform this office, from having proposed the award in Council; but whether preference should be given to your Lordship, to Sir Henry Rawlinson, or to Sir Andrew Scott Waugh, who was so long Director of the Great Trigonometrical Survey, I am sure you will, as a scholar and geographer, deeply versed in Asiatic subjects, willingly respond on behalf of the Pundit, and unite with us all in saying that there never was a gift more worthily obtained. I need not recapitulate all that the Pundit has done. He has laid down, in travelling from Nepaul to Lhasa, and along the great Thibetan road to Lake Manasarowar, a route-survey of 1200 miles of country previously scientifically unexplored, and has taken, besides, a measurement of the city of Lhasa. The details of his journey have been communicated to the Society, in the admirable report of Captain Montgomerie, to whom I beg you will convey our feelings of warm approbation of the skill and energy with which he is instructing these native explorers, and fitting them for important geographical discoveries."

LORD STRANGFORD replied :—

"MR. PRESIDENT,—You take me a little by surprise in naming me as the deputy of the remarkable Pundit who is to receive this award of the Royal Geographical Society. The rightful sponsor of the Pundit is our still more learned Pundit Sir Henry Rawlinson, on whose suggestion the award was made. But as you have done me the honour to choose me to speak vicariously, I need only say that I acknowledge with gratitude on his behalf the very high honour which you have done him. And in this I see a recognition not only of his services, but also, through him, of the common brotherhood and common intellectual capacity of natives of India with ourselves to share in our scientific honours. I am certain that the award will be duly appreciated at the present time, when the native public of India is being thoroughly educated to express its own wants and its own sentiments through the public press. It will resound through the length and the breadth of the land to the honour of the Society. I cannot leave the subject without speaking in my own person in appreciation of the Pundit's merits, as shown in his great geographical achievement. It is not only that he, a native of the plains, has emulated the Alpine Club, by climbing to a height of 15,000 feet, and showing wonderful endurance of Alpine hardships in journeying for two or three months along a plateau at this height, but also that he has shown extraordinary tact, a wonderful power of conciliation and knowledge of human nature, in overcoming so many political difficulties when accomplishing this really remarkable task. Captain Montgomerie conveys an adequate idea of the man and his work, by saying

how much he wishes the President and the Society could get a sight of this man, who has the power of making friends with every one he sees. He had shown himself a conscientious Geographer in taking such continual observations, which had been tested and verified by Captain Montgomerie himself, and in short he had proved himself in every way worthy of Captain Montgomerie's selection."

Mr. Le Neve Foster, Secretary of the Society of Arts, then presented to the President Mr. William John Wilson, as the successful Candidate of the present year for the Royal Geographical Society's Prize of Five Pounds, in the Examinations conducted by the Society of Arts. In delivering the amount to Mr. Wilson, the President congratulated him on having being the first recipient of the Prize who had been publicly rewarded and honoured at the Anniversary Meeting of the Society.

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## A D D R E S S

TO

## THE ROYAL GEOGRAPHICAL SOCIETY.

*Delivered at the Anniversary Meeting on the 25th May, 1868.*

BY SIR RODERICK IMPEY MURCHISON, BART., K.C.B.,  
PRESIDENT.

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GENTLEMEN,

The tide of prosperity, which for some years has marked the progress of the Royal Geographical Society, continues, I am happy to say, to flow on without symptoms of an ebb. Rejoicing as I do in our popularity and usefulness, it becomes me now to state, that I have seen with regret the great difficulties which have occurred in affording sitting room to our greatly-augmented numbers, and the visitors who are introduced to our meetings. Complaints having proceeded from many of our old Associates as to the impossibility of finding places for themselves, the Council were under the necessity of devising a remedy, and the following arrangement has been made:—The large central portion of the hall will henceforward be exclusively occupied by Fellows, the sides only being set apart for ladies and visitors.

Though this plan is as good as present circumstances will admit, it is merely temporary; for the wings of Burlington House, in one of which we have been permitted to assemble, through the courtesy of the Royal Society and the University of London, are ere long to be pulled down; and when the new rooms of the Royal Society are built, no one of them will be large enough to receive the audiences that attend our meetings. Now, as under any circumstance we shall be compelled to raise a great edifice for ourselves, I have the pleasure to announce, that, ever mindful of the coming necessity, the Council have applied to the Chief Commissioner of Woods and

Forests, and obtained a promise that we shall be considered, on the allotment of the ground about to be cleared between Whitehall and the Thames. I trust that an advantageous site may be ceded to us, as the public body which, for the small sum of 500*l.* per annum granted to us by Parliament, keeps up for the use and consultation of the public a well-furnished Map Office.

I may add that it is my hope that when, through the demolition of the building in which we are now assembled, we shall be obliged to seek for a temporary asylum whilst a large edifice is being raised out of our own funds, we may, upon application, be allowed to meet *ad interim* in the grand new hall of the University of London, now nearly finished, the Council of which body, in conjunction with the Royal Society, has hitherto treated us with so much consideration.

In the following review of the affairs of the Society, and the progress of Geography, during the past year, I commence, as on previous occasions, with a notice of the career of the distinguished men lost to us by death, since the last anniversary.

### OBITUARY.

MR. WILLIAM JOHN HAMILTON.—By the decease of our former excellent President, Mr. W. J. Hamilton, Geography has lost an enlightened and zealous supporter, whilst I have to grieve for one of my best and most attached friends. Born in London (5th July, 1805), his education was commenced at the Charter House, and completed at Göttingen, where he acquired that facility in German which was of great use to him in his subsequent career.

His first pursuit in public life was diplomacy. He was attached to the mission at Madrid in 1827, in 1829 was removed to Paris as an Attaché to the Embassy, and subsequently became Précis Writer at the Foreign Office, under the Earl of Aberdeen. In this commencement of an active life, he very naturally followed the steps of his eminent father, Mr. W. Hamilton, so long distinguished as a diplomatist, and not less so for his learning and that love of fine art which rendered him in his latter days one of the most efficient of the Trustees of the British Museum. On our part, also, we must never forget that Mr. Hamilton, senior, was the first of our Presidents who delivered one of these Anniversary Addresses, which, since his time, have formed an integral and essential part of the volumes of our Journal. As soon as the father perceived that his son had

reached an age when his talents required to be directed to a special pursuit in Science, to be combined with Art, and which would elicit all his energy, he requested me to attract William's attention to Geology. In this way I had not only the satisfaction of giving my friend his first lessons on geology in the field (anno 1835), but also of making him known to the accomplished naturalist, the late Hugh Strickland; and soon after was formed the scientific and antiquarian project of these two fine young men, who embarked together with the noble intention of investigating the Bosphorus and Asia Minor. The son was thus enabled to gratify the wish of his parent in working out the comparative geography of these regions, whilst with his companion he was sure to unravel many phenomena in Natural History.

As respects Turkey in Europe, Hamilton and Strickland speedily threw a new light on the geological structure of the environs of Constantinople; but their friendly partnership was soon dissolved, for Mr. Strickland was compelled to return home on family affairs.

Left to himself, Mr. W. Hamilton carried out and completed that survey of Asia Minor, which, being published in 1842, justly obtained for him a high position among travellers, and elicited the warmest commendation of Baron A. von Humboldt. No one indeed can peruse these volumes, or examine the map which accompanies them, without being struck with the varied qualifications which our deceased associate brought to bear, in illustrating the geography, both physical and comparative, as well as the geology of this remarkable region. More recently, indeed, our Honorary Member, M. Pierre Tchihatchef, after several excursions in Asia Minor, has produced a more complete map, particularly as regards geology; but still, I am sure that my eloquent Russian friend will unite with me in admiring the previous efforts of Hamilton. In fact, the minute notice of every mile on his route, as noted in his Itinerary, the exact time of departure and arrival, the constant observation of each turn of the road with compass in hand, and the minutest notice of every natural feature, was an earnest of what this most persevering and conscientious man was destined to be through life.

In the year 1843 Mr. Hamilton was honoured with the Founder's Medal of the Society for these researches in Asia Minor; and it is a remarkable fact that he and the lamented and excellent Admiral Smyth are the only Presidents who, since the foundation



of our Society, have received our Gold Medals for actual journeys and discoveries in geography.

In the sister science of Geology Mr. Hamilton was distinguished, not only as a good sketcher and a clear writer, but also as having been so much looked up to by his associates, that having presided over the Geological Society from the years 1854 to 1856, he was again chosen President in 1864, and served till 1866. Besides his Anniversary Addresses, which are models of accurate research, he had in previous years been of signal use to the Geological Society, by acting as Secretary and Foreign Secretary. His great merits in all these capacities have, indeed, already had justice done to them by Mr. Warrington Smyth, the late President of the Geological Society.

In the years 1837-41-42 and 1847, Mr. Hamilton acted as the President of this Society, and his Anniversary Addresses were distinguished by the perspicuous observations with which they were filled, whilst it was his constant and earnest endeavour to improve and fix the principles and regulations by which we have ever since been governed.

In his last Address, when speaking of the means by which the advancement of geographical science was to be best attained,—some persons being of opinion that we should confine ourselves entirely to purely scientific subjects, others preferring descriptive travels and more amusing topics,—Mr. Hamilton very wisely condemned such exclusive practice, and thus left it recorded:—"They whom I am now addressing will probably agree with me, that it is only by a complete union of scientific truth with popular interest, that we can hope to see the science of geography take that hold of the public mind in this country, which shall ensure it the support necessary to secure its efficiency and to maintain it in a healthful and powerful condition."

This principle you well know, gentlemen, has ever guided me since I first presided over you; and it is unquestionably through its steady application that our members have risen from 668, when Mr. Hamilton last presided, to our present potent cypher of 2150 Fellows.

In a public capacity Mr. Hamilton represented the borough of Newport, in the Isle of Wight, in the Conservative interest, from 1841 to 1847. In later years he devoted himself assiduously to the cultivation of several branches of geology, and by a patient study of

conchology became an adept in his acquaintance with all tertiary fossils, as testified by various memoirs published in the *Quarterly Journal of the Geological Society*.

As a President he was highly esteemed for the fidelity, urbanity, and integrity with which he discharged his duties, in the course of which he made many sincere friendships; and I can truly testify that his death, which alas! came upon him at much too early a period, was as deeply lamented by geologists and geographers as it was by a large body of private friends. In addition to his scientific pursuits, Mr. W. Hamilton was an excellent man of business, whether as member of Committees of the House of Commons, or as Chairman of the Great India Peninsula Railway Company, with which body he was connected from the year 1849 till his death on the 27th June, 1867.

He was twice married. By his first wife, Miss Margaret Trotter, to whom he was united in 1832, he had one son, now Lieutenant-Colonel Robert Hamilton, of the Grenadier Guards. By his second wife, the Hon. Miss Margaret Dillon, he has left three sons and four daughters, all surviving; and who, with their excellent and affectionate mother, deeply deplore their loss.

Among the scientific distinctions of Mr. W. Hamilton, it is to be noted that he had not only presided with credit over the Royal Geographical and Geological Societies, but that he was also a Fellow of the Royal Society, and a Honorary Member of various Foreign Scientific bodies.

The EARL OF ROSSE.—By the death of this nobleman, Science has been deprived of one of her most illustrious cultivators,—one who, by his marvellous skill and perseverance, constructed a telescope of such power that he was enabled to open out a long vista through the distant heavens, and make observations of celestial bodies, of which mankind had hitherto been entirely ignorant. By means of his gigantic instrument, astronomers have been able to examine those remote nebulous bodies which seem to be in a transitional state, or as the germs of future planetary systems; and thus we peer into the innermost secrets of Nature, and aid is lent to the sister science of Geology by the light thrown on the subject of the origin of the planet on whose surface we live.

It would be presumptuous on my part to attempt to do justice to the services rendered by Lord Rosse to Astronomy; the more so as they have been admirably expounded by the Rev. Dr. Robinson, the celebrated astronomer, from whose sketch of the career of his

lamented friend, in the Obituary of Fellows of the Royal Society, I derive the following details :—

William Parsons, third Earl of Rosse, was born at York on the 17th of June, 1800, of a family which had been settled in Ireland from the time of Elizabeth. He was educated at home by a private tutor, and, when eighteen years old, entered Trinity College, Dublin. Although his career there was eminently successful, he did not graduate, but went to Oxford, where he entered Magdalen College, and, on leaving the University, commenced public life as the representative of King's County in Parliament. His political career was intermitted at the end of eight years, in order that he might devote himself with more freedom to his favourite scientific pursuits, and discharge more completely the duties of a landed proprietor, which he did most conscientiously. But, although kind and considerate as a landlord, he was not the less resolute in supporting the authority of law and putting down the murderous societies which were the terror and curse of that part of Ireland. This, of course, made him a mark for the assassin. He knew his danger; but the knowledge neither made him shrink from his duty, nor embittered his feelings against the misguided people who were conspiring against him. This continued until the time of the famine, which crushed under the weight of real misery the imaginary grievances of the agitators, and showed them who were their real friends. None stood the test better than Lord Rosse, who, during some years, applied nearly all the income of his Irish property to relieve the unhappy sufferers. This told on their hearts, and they thenceforward became proud of his increasing fame, and regarded him as an honour to their nation. He was elected an Irish Representative Peer on the death of his father in 1841; and previously, in 1831, he had been appointed Lord Lieutenant of his county. In 1836 he married Miss Field, a partner worthy of him, who sympathised in his pursuits, and even mastered enough of astronomy to help him in his calculations.

Although most widely known as an astronomer, Lord Rosse was by no means exclusively devoted to this science. In fact, few minds of our day have grasped so wide a range of knowledge. He was skilled to an extraordinary degree in mechanics, and applied his abilities, as is well known, with unusual patience and success to experiments on the casting and polishing of metallic specula for the reflecting telescope. He was a good chemist, and would have attained a high position as a civil engineer, if he had devoted himself to this profession. He was also a master of political economy,



and devoted for years much attention to the great question of national education, and the loss of his authority on that subject is deeply felt in Ireland at the present day.

Independently of the great telescope at Parsonstown, constructed by himself, Lord Rosse's chief titles to scientific fame are furnished by the memoirs he contributed to the Royal Society, and which were published in their 'Transactions' for 1840, 1850, and 1861. It would be foreign to my present purpose to detail the processes by which, through many years' well-directed labour, he arrived at the completion of his renowned instrument. Suffice it to say, that his attention was first directed to this subject in 1826, and it was not before 1845 that his efforts were crowned with success, and his mighty telescope so far complete that he was enabled, on the 13th of February in that year, to make, in company with his friend Sir James South, his first observation of the celestial bodies. Since then, however, he continued to improve the instrument for many years.

With all his scientific merit, the Earl of Rosse was also a model man in his social qualities; his conduct being guided by the highest moral principles. Those who, like myself, were attracted to him by old personal friendship when visiting him at his seat in Ireland, and seeing how he enjoyed the companionship of his estimable Countess, and how wisely he instructed his children, could not fail to love him as much for his kindheartedness and simplicity of character, as they admired him for his great acquirements. It is, indeed, a source of the greatest satisfaction to the numerous friends of the late Earl, that he so brought up his sons that his successor has already, by new discoveries in astronomy, given us the assurance that he is a worthy inheritor of the name of his illustrious father.

Intimately dependent as Geographers are upon Astronomers, I reflect with some pride on the fact, that this eminent cultivator of the sister science was so long connected with our Society, having been elected in 1844, on being introduced by myself; and I well know how warm was the interest he took in our prosperity.

Lord Rosse was President of the Royal Society from 1848 to 1854; and in 1862 was elected Chancellor of the University of Dublin.

His appearance promised a long life, but an accident, so trifling that it was neglected till too late, broke down his strength and brought him to his end. A slight sprain of the knee produced, after

some months, a tumour, which was ultimately removed by a severe operation. The wound was slowly healing, but he sunk under the process; and, on October 31st last, he died as he had lived, patient and uncomplaining under his long and acute suffering, gentle and considerate to all around him, and strong in Christian hope.

Admiral Lord COLCHESTER.—By the decease of Lord Colchester, our Society has lost one of its most earnest supporters, who, having joined us in 1838, and having during many years assisted us by his advice as member of the Council, was during the years 1846 and 1847 the President of our body.

Lord Colchester was born in 1798, and educated at Westminster School. He entered the navy in 1811, and served successively on board the *Revenge*, Admiral the Hon. A. Legge, in the Mediterranean, the *Bacchante*, Captain Hoste, in the Adriatic, and later, during the hostile operations of the year 1814, on the coast of America. Between these two periods of service he completed the theoretical part of his naval education at the Naval College at Portsmouth. In 1816 he joined the *Alceste*, which conveyed Lord Amherst and his embassy to China. On arriving in that country he occupied a place in Lord Amherst's suite, and accompanied him to the palace of Yuen-men-yuen, near Pekin, since rendered famous by its destruction at the hands of the British troops in the last war, and returned with the Ambassador through the interior of China to Canton. He also drew the sketches contained in the history of this embassy by Sir Henry Ellis. He was further employed in making a plan of the River Yang-tsze-Kiang, and it was this acquaintance with the internal water-communications of this great region which enabled him, as we shall presently see, to render a great service to his country, by a plan which he communicated in 1840 for the invasion of China, and which was eventually adopted with most successful results by the Earl of Ellenborough when Governor-General of India.

Obtaining the rank of Lieutenant in 1817, he again, in 1818, went to sea, on board the *Liffey*, Captain the Hon. H. Duncan, and visited the West Indies, the Baltic, and Mediterranean. On obtaining the rank of Commander he was appointed to the *Racehorse*, and was in the Levant during the Greek war of independence. As Commander of the *Columbine* he was, subsequently, again in the same part of the world. During these cruises he made an examination of the harbours of the Gulf of Kolohythia, and in 1826 received his commission as Post-Captain. After the death of his father and his succession to the Peerage he was appointed to the command of the *Volage*, and pro-

ceeded to the South American station, whence he made a voyage to Europe to convey the Emperor and Empress of Brazil to Cherbourg. On the completion of this duty he returned to his station and visited both the eastern and western coasts of South America, making an inland journey to Arequipa when off the coast of Peru. Subsequently, during the Belgian revolution, the *Volage* was despatched to the North Sea, and, on the surrender of the citadel of Antwerp, recalled home. With this closed Lord Colchester's active service; for, having afterwards devoted himself to Parliamentary duties, he never again held a command afloat, and became in course of time an Admiral on the reserved list.

In his parliamentary career Lord Colchester consistently adhered to the Conservative interest, and spoke occasionally, from his first session in 1833, both on naval and general topics. On the approach of the Chinese war in 1839 he drew up a plan, which he had long previously conceived, for intercepting the interior communications of the empire by sending a fleet up the Yang-tsze-Kiang. He consulted on this subject the veteran Chinese scholar Sir George Staunton, who strongly approved of it, and it was placed in the hands of Lord Palmerston, the Foreign Minister at that period; but nothing beyond a preliminary survey of the mouth of the river was then undertaken, and it was reserved for the new ministry, after the change of government in 1841, to profit by the suggestion. Lord Colchester's map of the Yang-tsze-Kiang, relating to the course of the river between the entrance of the Great Canal and Nankin, was engraved by the Admiralty, and when Lord Ellenborough was appointed Governor-General of India he sent reinforcements in March, 1842, to Sir Hugh Gough and Sir W. Parker, with orders at once to proceed to action on the Yang-tsze. The capture of Tching-Kiang-Foo, at the junction of the canal with the great river, closed the struggle, and Lord Colchester's claim to have aided in winning this triumph for his country was fully recognised by the Governor-General, who carried his suggestions into execution.

On the formation of Lord Derby's first administration, in 1852, Lord Colchester was appointed to the united offices of Paymaster-General and Vice-President of the Board of Trade. In 1853 he received the honorary degree of D.C.L. from the University of Oxford, and in 1858, Lord Derby being again Prime Minister, he was appointed to the office of Postmaster-General. He discharged the duties of that office with great industry; but, unhappily, at this time his general health underwent a deterioration, of which the principal



symptom was a swelling of the leg, from which he never completely recovered. He continued, however, to attend the House and exert himself in behalf of the various charitable institutions with which he was connected as Chairman, until 1866, when his health was further undermined, and from February, 1867, to his death, which took place on the 18th of October last, he was almost entirely confined to his bed.

Lord Colchester married in 1836 Elizabeth Susan, second daughter of the first Lord Ellenborough, by whom he had an only son, the present Lord, who as one of our young associates is, I trust, destined to fill the post so worthily occupied by his excellent parent, whose modest and retiring manners, accomplishments and good sense, accompanied as these qualities were by the truest kindness and the highest sense of honour, endeared him to every one who knew him.

The Right Hon. Sir George CLERK.—By the death of this useful and highly-respected man, in his eighty-first year, I have lost a friend with whom I began life fifty-two years ago, and whose many good qualities I have never ceased to esteem during that long period.

For many years he was the representative in Parliament of his native county of Edinburgh, and he would doubtlessly have continued to enjoy that honour to the day of his death, had not the Reform Bill of 1832 entirely broken up the old social system on which Scotch society had been based for centuries. That Bill, which was a salutary reform in England, produced a complete revolution in Scotland, where up to that day landed proprietors only who were possessed of a certain rental returned the county member, who was thus chosen as the true representative of their broad acres. Such has been the change resulting from this Act, that the landed proprietors have to a very great extent lost their legitimate influence. But whilst Sir George was ever a Conservative in politics and occupied several public offices of mark, he steadily supported Sir Robert Peel when that great statesman felt it to be his duty to abrogate the Corn Laws.

Among the public offices he filled, Sir G. Clerk had been Secretary of the Treasury, Vice-President of the Board of Trade, Master of the Mint, and for many years the so-called "Whip" of the old Tory party in Parliament.

Sir George Clerk was a true lover and patron of the Fine Arts, and was noted through life as a warm supporter of the Academy of Music

and all good musical meetings, as well as the supporter of many a promising proficient in the art.

He was also much attached to our Science of Geography and its Natural History applications, having been a Fellow of our body since our foundation, and having acted during the last six years of his well-spent career as President of the Zoological Society.

He married Miss Maria Law in 1810, and this very estimable lady, who bore him twelve children, predeceased him only by one year. He is succeeded by his eldest son, now Sir James Clerk.

Captain James MANGLES, R.N.—As one of the scientific officers of the Navy, Captain Mangles well deserves to be favourably noticed on this occasion, particularly from the interest he had always taken, during a long life, in the advancement of geographical science. He entered the Navy so long ago as the year 1800, and for several years saw much active service in various parts of the world, on board the *Narcissus*, 32 guns, under Captain Ross Donnelly. Subsequently, as Lieutenant of the *Penelope*, he aided in the reduction of Martinique in February, 1809, and bore his share generally in the naval enterprises of those stirring times until 1815, when, having attained the rank of Commander, he retired on half-pay.

I formed an acquaintance with Captain Mangles as early as the year 1816, when he was travelling in Italy on his way to the East with his companion and brother officer, the Hon. C. L. Irby. The results of their tour were published under the title of ‘Travels in Egypt, Nubia, Syria, and Asia Minor,’—a work that soon attained a wide popularity. Since then he devoted a great portion of his time to the study of Geography and Hydrography, and published at intervals several treatises, which evince his zeal in the study of these sciences: such were his ‘Geography, Descriptive, Delineative, and in Detail,’ his ‘Illustrated Geography and Hydrography,’ and others. He was elected Fellow of the Royal Society in 1825, and was one of the earliest Members of our own body, having been enrolled in 1830. His death took place on the 18th of November last.

Mr. Ashurst MAJENDIE.—One of our original members, Mr. Ashurst Majendie, the proprietor of Castle Hedingham, in Essex, was a man of considerable knowledge and of a very inquiring mind. To geographers he was chiefly known as the brother-in-law of Lady Franklin, and for the lively interest which he took in advocating, with myself and others, the search after the great Arctic hero.

Mr. John Minet LAURIE, of Maxwellton House, Glencairn, was

known as a profound historian. He formerly sat in Parliament for Dover, and for Maidstone. He was elected a Fellow of the Royal Geographical Society in 1861, and died on the 25th of February, 1868, in the fifty-sixth year of his age.

Rev. Pierce BUTLER.—By the death of the Rev. Pierce Butler, rector of Ulcombe, Kent, we have lost, in the prime of life, an associate who was a true Geographer at heart, and an experienced traveller, and who, for some months prior to his death, devoted a large share of his time and energies to a project for a survey of the peninsula of Sinai, with a view to extending our knowledge of Biblical geography.

Mr. Butler was born in 1826, and was the third son of Lieutenant-General the Honourable Henry Edward Butler, and grandson of the third Earl of Carrick. He graduated at Trinity College, Cambridge, in 1848, and soon afterwards took holy orders. At the close of 1853, his eldest brother, Captain H. I. Butler, of the 55th Regiment, an officer of great ability and promise, received special leave of absence from Government for the purpose of exploring a portion of the peninsula of Sinai, and, attracted by this opportunity of visiting, in his brother's company, a country in which from boyhood he had ever felt the deepest interest, Mr. Butler resolved to go with him. Their preliminary researches led them to the conclusion that a careful survey and systematic examination were essential to the solution of the many interesting problems of the peninsula. This task had scarcely been commenced when news reached them of the outbreak of the war with Russia; and Captain Butler, obeying the call of duty, relinquished his interesting work, and sailed eastward from Alexandria in April, 1854, to join the expeditionary army. Mr. Butler, after visiting the Holy Land and Constantinople, returned, at the end of May, to England; but the soldier-brother was destined never to follow him, for, ere the year was out, his friends at home received the sad intelligence that he had fallen on the battle-field of Inkerman, whilst serving on the Staff of the First Division of the army. On the 21st of the preceding June, another gallant brother, Captain James Armar Butler, the intrepid "hero of Silistria," had died of wounds received during that memorable siege—struck down in the height of a career so brave and so distinguished that the sorrow his father and friends felt at his death was shared, as Lord Hardinge feelingly expressed it, "by the country, the army, and the Sovereign."

Two noble brothers had thus fallen in their country's cause within



the short space of five months ; and now, Pierce Butler himself, animated by that chivalrous spirit which was one of the finest traits of his character, determined to go out at once to Turkey, for the special purpose, amongst others, of volunteering his ministrations to the sick and wounded soldiers of our army, in whatever sphere they might be most acceptable : he felt, indeed, that some such useful Christian service was the most fitting tribute he could offer to the memory of his lamented brothers. He accordingly proceeded to Constantinople in December, 1854, and shortly afterwards accepted the offer of an appointment as one of the chaplains to our army in the East. In discharging this voluntary duty his gentle, genial manners and amiable disposition won the hearts of officers and men ; and those now living who were present with the Second Division in the camp before Sevastopol, must retain a clear and grateful recollection of his ministrations.

At the close of the Crimean war Mr. Butler resigned his appointment as chaplain, and for the next five years was a constant traveller in America and in many parts of Europe. In 1861, he was presented to the rectory of Ulcombe, near Staplehurst, a living in the patronage of his family, which he held until his death ; and in the same year he married. In the retirement of a country life, the interest which his visit to the Desert of Sinai in 1854 had created was ever prominently before him, and to carry out, if possible, the work of survey and exploration in that region, which his gallant brother had been so reluctantly compelled to relinquish, was the one object which, of all others, he was most desirous to effect. Encouraged by the assistance which Government had afforded towards the recent survey of Jerusalem, he determined last year to endeavour to obtain, from amongst his own relatives and friends, and other persons likely to take an interest in Biblical and geographical research, sufficient funds for a topographical survey of at least the most interesting portions of the peninsula of Sinai ; and, if successful in this, to solicit the aid of Government in its execution. In a few weeks he had obtained so many liberal promises of support from noblemen and gentlemen interested in the subject as to justify him in laying his plan before the Secretary of State for War. Sir John Pakington readily lent his aid, and at once authorised Sir Henry James to undertake the superintendence of the Sinai survey, as he had formerly done of the survey of Jerusalem, and to equip and send out an

officer and a small party of the Royal Engineers, when the necessary funds should be forthcoming. Lord Stanley, as the head of the Foreign Office, also afforded the scheme every facility in his power, and Mr. Butler, confident then of ultimate success, prepared to pay a short visit at once to Egypt, with the view of making preparatory arrangements for the arrival and progress of the surveying party, which it was proposed to despatch from this country in the coming autumn, and which he himself hoped to accompany. He had even taken his passage for Alexandria, and was actively preparing for departure, when severe illness overtook him; and on the 8th of February,—on the very day, and almost at the very hour, on which he was to have started for Egypt,—he died at his home in Kent, ere he had quite completed his forty-second year.

Mr. Butler's loss is mourned by many who valued and shared in his zeal for the cause of Biblical Geography, as well as by a large circle of personal friends, to whom he was endeared by the attributes of a true and high-minded Christian gentleman. There is something touching and even mysterious in this history of two brothers, both removed at a comparatively early age\* by death, when on the eve of carrying out the project in which both felt so keen an interest, and which both strove so hard to accomplish. It is, however, earnestly to be hoped that this useful undertaking will not be permitted to drop; and Captain Palmer, of the Royal Engineers, to whom had been entrusted the detailed work of the proposed survey, and to whom I am indebted for this sketch of Mr. Butler's career, informs me that there are many amongst Mr. Butler's friends who are most desirous to carry it to a successful termination. The Rev. George Williams, of King's College, Cambridge, and the Rev. F. W. Holland, already well known as a traveller in the Sinaitic peninsula, have both volunteered their aid and co-operation to push forward this work. It may be truly said that, whoever may henceforward be the active promoters of this enterprise, and whatever may be the measure of ultimate success which awaits it, it is one with which most assuredly the name of Butler must ever be closely and honourably connected.

Sir Charles LEMON, Bart.—By the decease of Sir Charles Lemon I have lost another old friend, who has left behind him a character which for high principles, benevolence, and friendliness, has never

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\* Captain H. J. Butler also died in his 42nd year.

been surpassed. In a word, no man of my time was ever more generally respected and beloved.

He was born in the year 1784, and dying on the 12th February of this year, he was then consequently in his eighty-fourth year.

In 1810 he married Lady Charlotte Strangways, youngest daughter of the second Earl of Ilchester, by whom he had one son only. The fond parents having a presentiment that their boy might meet with his death on the water, selected Harrow School as the place of his education, because there was not, as at Eton and other places, a river near it. Yet, to their intense grief, the youth was there drowned in a pond! and the shock was so great that the affectionate mother never recovered from it.

Sir Charles Lemon was for many years the representative in Parliament of his native county, Cornwall, and was ever a consistent supporter of the old Whig principles. As a magistrate and country gentleman he seized every opportunity of promoting works of usefulness and charity, and at his hospitable mansion of Carclew his fine social qualities were heartily appreciated by all those who, like myself, have passed enjoyable and pleasant days there.

Sir Charles Lemon was much attached to Science, particularly to those branches of it which related to or improved the mining operations of his own county. In the year 1846, being President of the Royal Geological Society of Cornwall, he invited me, his guest, to attend an anniversary meeting of that body and say something which might give encouragement to the tin-miners, who were at the time in a suffering state, and many of them out of work. It was then, referring to what I had been speculating upon in our own Society and at other places in the two previous years, as to the auriferous character of the Australian rocks, when compared with those of the Ural Mountains, that I ventured to counsel these tin-miners to emigrate to Australia and dig for gold. Some of them took my advice, and in 1848 I was in possession of small specimens of gold ore sent home by them. Thereon I took more courage and warned Her Majesty's Government of the great event which was about to be fulfilled. I will only add that the so mis-called *discovery* of gold, *i. e.* the diggings on a profitable scale, were not opened out till 1851, and that my much earlier letter to the Colonial Secretary is printed in the Blue Book on Gold.

Sir Charles Lemon was elected into our Society in 1836; he was also a Fellow of the Royal and Geological Societies, and the Presidents of these bodies will, I am sure, be as ready as myself



to testify to the high worth of so excellent and accomplished a man, and such a choice specimen of a thorough English gentleman.

Mr. John CRAWFURD, F.R.S.—By the recent death of this enlightened and excellent man, on the 11th instant, I was plunged into a profound sorrow—a sorrow shared, I am sure, by everyone who knew him, and particularly by the Fellows of the Royal Geographical and Ethnological Societies, as well as the members of the Athenæum Club.

Born in the island of Islay, in 1783, he was in his 85th year when he was most unexpectedly carried off by an attack of inflammation of the lungs. For, although he had reached a ripe old age, he had preserved his habitual sound health, and had applied to the last the full vigour of his strong mind in so genial a manner, that he occupied a position among us which was unrivalled, and makes us all deeply sensible of the sad loss we have sustained.

To attempt to do justice in this short notice to the various merits of John Crawford—whether as a great traveller, an accomplished Oriental scholar, an able administrator, a sound geographer and ethnologist, and an accurate statist—is wholly beyond my power. Few men, indeed, of this century have passed away whose deeds more imperatively call for a faithful and full biography. Earnestly hoping that such a work may be undertaken by some competent person among his numerous friends and admirers, I can only briefly advert to some salient points of character in the long, distinguished, and useful career of my lamented friend.

Having studied medicine for three years at Edinburgh, he went to India in 1803, as an Assistant Surgeon in the Company's military service, and was almost immediately immersed in active duties. Thus, he served under Lord Lake, when that General invaded the dominions of Scindia, and was also present at the siege of Delhi. In the following year he accompanied Colonel Monson's force in the advance to Ougain and in its retreat before Holkar's army; and we have still happily among us a fresh and vigorous veteran Indian soldier—Colonel Sykes—who informs me that in February, 1805, he knew Crawford when he was in medical charge of twelve companies of Sepoys in the beleaguered fortress of Rampoor.

After five years of service in the North-western Provinces of India, he was transferred to Penang, where he commenced those studies of the Malay languages and people which enabled him

eventually to compose that remarkable work the 'Malay Grammar and Dictionary.' In 1811 he was selected by Lord Minto to accompany him in the great expedition which led to the conquest of Java. There, as a diplomatist, he represented the British Government for nearly six years, during which he made extensive journeys and voyages, and amassed those diversified materials in Ethnology, Natural History, and Geography, which, after his first return to England in 1817, he published in 1820 under the title of 'History of the Indian Archipelago.'

Going back to India in 1821, he was appointed by the then Governor-General, the Marquis of Hastings, to the diplomatic mission sent to Siam and Cochin China; and on this occasion he obtained the highest credit from the Indian Government. It may be affirmed, indeed, that during his Indian services all leading public men sought for his counsel and advice; and I might enumerate the names of a host of eminent authorities, including Colebroke, Mountstuart Elphinstone, and many others, who were his intimate friends and correspondents.

From 1823 to 1826, acting as Governor of Singapore, after the retirement of Sir Stamford Raffles, he became the second founder and wise administrator of that colony, which, through his sagacious arrangements with the neighbouring chiefs, was raised into the highly important position it has ever since maintained.

In addition to the highly valuable commercial and other statistics registered by our deceased Fellow, in relation to which his name stands out in gazetteers throughout the world, he never neglected any branch of natural knowledge. Thus it was that, in his voyage up the Irrawady to the capital of Ava, in 1826, he collected those fossil bones of Mastodon, large Tortoises, and Crocodilia, &c., which were described by Dr. Buckland and Mr. Clift, and which gave to the former the opportunity of generalising on the important fact, that there existed in the Indian regions formations analogous to the tertiary and superficial deposits of Europe.\* It was when these remarkable collections were the admiration of geologists, that I became better acquainted with Mr. Crawford; and from that day, now forty-two years ago, our intimacy strengthened with each succeeding year.

For some time, indeed, after his return from India, he was more immersed in political affairs than harmonised with my own special

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\* See 'Transactions of the Geological Society,' second series, vol. ii. p. 377.

occupations. Thus, with his large and liberal views on the subject of Free Trade, he took an active and influential part in the support of his friend Mr. Joseph Hume, in breaking up the old commercial monopoly of the East India Company, and mainly helped to bring about that great fall in the price of tea, and other necessities of life, which has proved such a blessing to the masses of the people. It is also known to me that Mr. Cobden highly estimated the efforts of Mr. Crawford in favour of Free Trade, particularly as shown in an article of the 'Westminster Review' of 1832.

He made two efforts, shortly after the passing of the Reform Bill in 1832, to obtain a seat in the House of Commons for two Scottish places—Glasgow and the Stirling burghs—but was unsuccessful. I have often rejoiced at these political failures; for, from that moment the strong mind and untiring energy of the man were devoted almost exclusively to his favourite topics of philology, ethnology, geography, and statistics; the fruits of his laborious studies first appearing in the 'Malay Grammar and Dictionary,' the preliminary Dissertation to which is a remarkable work in itself. Tracing the affinities of a vast number of the languages of the Indian Archipelago, and even in parts of the Pacific, to the Malay root, he ascribed this wide diffusion to the insular character of this vast region. His first-rate merits as a philologist have indeed been canonized in the writings of William von Humboldt in his great work 'Über die Kawi-Sprache auf der Inseln Java.' In it the illustrious Prussian expressly stated, that without the valuable contributions of Mr. Crawford, he could never have succeeded in mastering the Javanese and Kawi languages, and he expresses the very great obligations of his brother Alexander von Humboldt and himself for the highly valuable contributions of our deceased Associate. In 1856 he published his 'Descriptive Dictionary of the Indian Islands and adjacent Countries,' which was in fact the completion and extension of his original work of 1820. This book, illustrated as it is with a most interesting map of the Asiatic Archipelago, is a striking specimen of the great capacity of the author. In it we find condensed in an octavo of 459 pages a surprising amount of accurate geographical, ethnological, and statistical knowledge.

First presiding over the Ethnological Society in 1861, he continued to be the life and soul of it to the day of his death. In fact, he gave to this body quite a new impetus, and astonished even his most intimate friends by his unceasing contributions on the prodigious variety of subjects which he skilfully connected with his



favourite science. The mere enumeration of the titles of these memoirs, as given in the appended footnote—all produced in seven or eight years—is a wonderful proof of the capacity, versatile power, and energy of an author who could bring out all these works between his seventy-eighth and eighty-fifth year.\* Including his frequent contributions to reviews and weekly newspapers, particularly the ‘*Examiner*,’ Mr. Crawford has perhaps written more than it has been given to any one author of this century to accomplish. I may here also observe, as a striking illustration of the logical accuracy of his thoughts and the strength of his memory, that his writings on the statistics of commerce, geography, philology and ethnology scarcely ever required a correction of his pen; for they exhibit fewer erasures and alterations than are to be seen in the original manuscripts of Walter Scott, or any other author, even of works of fiction.

Personally I have to acknowledge with gratitude the contributions he made to several of my Anniversary Addresses, whenever it fell to me to allude to India or its great Archipelago, and on this very occasion I am indebted to him for the article on Burmah.

Yet, with all this incessant literary labour, he found time to read extensively, and store up in his surprising memory all the knowledge that he had ever acquired. He also found leisure to hold much social converse with many friends, both young and old; and few of the members of the Athenæum Club will now enter

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\* Out of the thirty-eight memoirs contributed by Mr. Crawford to the ‘*Journal of the Ethnological Society*,’ I may mention the following:—‘On the Connexion between Ethnology and Physical Geography;’ ‘On Numerals as Evidences of the Progress of Civilisation;’ ‘On the Antiquity of Man from the Evidence of Language;’ ‘On the Commixture of the Races of Man as affecting the Progress of Civilisation;’ ‘On Colour as the test of the Races of Man;’ ‘On the Relation of the Domesticated Animals to Civilisation;’ ‘On Language as a test of the Races of Man;’ ‘On Lyell’s Antiquity of Man,’ and ‘Huxley’s Evidence on Man’s Place in Nature;’ ‘On the Sources of Tin for Bronze Tools and Weapons of Antiquity;’ ‘On the supposed Infecundity of Human Hybrids or Crosses;’ ‘On the supposed Stone, Bronze, and Iron Ages of Society;’ ‘On the so-called Celtic Languages in reference to the question of Races;’ ‘On Cannibalism in relation to Ethnology;’ ‘On the Physical and Mental Characteristics of the Negro;’ ‘On the Origin and History of Written Language;’ ‘On the Ancient Hindu Sacrificial Bell found in the Northern Island of New Zealand;’ ‘On the Invention of Writing Materials in reference to Ethnology;’ ‘On the Migration of Cultivated Plants in reference to Ethnology;’ ‘On Caesar’s Account of Britain and its Inhabitants;’ ‘On the History and Migration of Cultivated Plants;’ ‘On the Dissemination of the Arabian Race and Language;’ ‘On the Migration and Cultivation of Sacchariferous Plants;’ ‘On the Plurality of the Races of Man;’ ‘On the Animal and Vegetable Food of the Nations of Australia in reference to their Social Position;’ ‘On the Classification of the Races of Man according to the form of the Skull;’ ‘On the History and Migration of Cultivated Plants and on Condiments;’ ‘On the Antiquity of Man’ (second memoir); ‘On the Ethnology of Abyssinia and adjacent Countries,’ read Nov. 12, 1867. Since the contribution of the last of these memoirs to the volumes of the Ethnological Society, Mr. Crawford has read certain others, including one on his objections to the Darwinian theory, another on coffee and other plants, and has left sixteen other manuscript papers behind him.

its great vestibule, in which he was generally to be seen in the afternoon, without mournfully regretting the absence of the cheerful countenance and friendly grasp of the hand of dear John Crawford.

Let me add that he was equally popular with the gentler sex, who could not fail to be attracted to him by his genial address and his happy and simple manner of conveying information. Well has it been said by an able writer in the 'Times'\* who commemorated his deeds, that "all the members of the Geographical and Ethnological Societies will miss the tall form of the evergreen veteran, who scarcely ever failed to take part in their discussions, and who, while stoutly maintaining his own views, showed a forbearance and courtesy which might well be imitated by all members of learned Societies."

So deeply were his feelings and sympathies bound up with our meetings, which he so often enlivened by his good humoured criticisms and wise cautions, that during his last and fatal illness, when his mind was wandering, he was frequently speaking volubly as if he were addressing our Society, with kind allusions to his associates.

As a Highlander, I am proud that Islay should have produced such a man as John Crawford; and when his remains were consigned to the grave on Monday last, it was a solace to my heart to see many true friends assembled to pay this last mark of respect to such a noble type of humanity.

Mr. Crawford was first married to Miss Robertson, who, losing her health in India, was coming home with her child when the ship was lost and all hands perished. He married secondly in 1820 the beautiful Miss Horatia Perry, daughter of Mr. James Perry. She died in 1855, leaving him one son, Oswald, now H. M. accomplished Consul at Oporto, and two daughters, Mrs. Mynors and Mrs. George Ramsay, to deplore the loss of the most affectionate of fathers.

In addition to the men who have passed away, and of whom I have treated as being distinguished in science and art or in the public service, are the following deceased Fellows:—

Mr. T. H. Alsager; Mr. Arthur Anderdon; Lieutenant J. B. Bewsher; Mr. Thomas Bigg; Mr. J. W. Church; Captain Creswell, R.N.; Mr. John J. Cowell; Mr. William Thomas Hodgetts Chambers; Dr. James French; Mr. Charles Fraser; Mr. J. L. Franklin; Mr. Nathaniel Gould; Mr. W. S. Harvey; Mr. Robinson Hudson; Mr. Andrew Henderson; Mr. John Jerdein; Mr. Charles Kean, the

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\* See 'Times,' May 13, 1868.

celebrated actor; Mr. A. O. Lloyd; Colonel Thomas McGoun; Mr. Colin J. Mackenzie; Mr. H. H. Morris; Captain Rochfort Maguire, R.N.; Mr. Duncan Macpherson; Sir Richard D. Neave, Bart.; Mr. James Price, M.D., &c.; Mr. William Reed; Mr. James Smith; Mr. R. S. Sutherland, R.N.; Mr. John Scott; Mr. William Scott; Mr. William Silver; Mr. Arthur Vardon; Mr. J. E. Worcester.

ADMIRALTY SURVEYS.\*—The Hydrographical Surveys of the Admiralty on the Coasts of the United Kingdom, in the Colonies, and in Foreign waters, have progressed during the past year favourably and successfully; and the Naval Officers employed in carrying them out have displayed their accustomed industry and ability, as will be seen by the following brief sketch of the result

*West Coast of England.*—H.M.S. *Lightning*, under Captain E. J. Bedford, with three assistants, has been employed in a re-survey of the upper portion of the Bristol Channel, from the termination of the Cardiff Survey of 1866-7 to the upper limit of King Roads, where many changes were found to have taken place in the bank-edges and shoals—so much so, as to require a re-buoyage on the part of the Trinity Corporation. This survey having been completed, the *Lightning* has been laid up, and the force on the home coasts reduced for the present to one regular surveying-vessel.

*East Coast of England.*—Staff-Commander E. K. Calver, with two assistants, in the *Porcupine*, have continued their examination of last year on the Eastern Coast with a view to the correction and revision of the Charts and Sailing Directions. The Coast and Harbours from the River Humber to the North Foreland have now been minutely examined. The entrance of Harwich Harbour, where improvements have been carried out to increase the depth, has been re-surveyed, and a new survey has been executed of the Suffolk Coast from a little below Lowestoft to Orfordness. During the progress of this latter work a discovery, interesting from its apparent connexion with the Suffolk beaches, has been made, viz., the existence of a tract of nine square miles of shingle a short distance in the offing between Dunwich and Sizewell, being of the same character as that of the beach, opaque flint, though more angular from having been subjected to less attrition: this feature may be of interest to those who have made the origin and movement of sea-beaches the subject of their investigations.

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\* Communicated by Captain Richards, R.N., F.R.S.



*Portsmouth.*—Staff-Commander D. Hall, with a steam-launch and a small party consisting of a boat's crew, has been employed in the examination of the bar and shoals at the entrance of this important harbour. The entrance as far as Spithead, and westward beyond Stokes Bay, has been very closely and carefully sounded on a scale of 24 inches to the mile; and a re-survey of the harbour itself on a scale of 30 inches to the mile has been commenced, which had become absolutely necessary in connexion with the extensive Government works being carried out, and the dredging away of the banks in contemplation.

*Channel Islands.*—Staff-Commander John Richards, with one assistant, and with such means as the vessels employed in the fishery and pilotage establishments are able to afford, is still employed in completing this intricate and very necessary survey. During the past year they have surveyed the Ecrehos and Drouilles rocks and islets, together with the Ecrevière Bank, all of which form a continuous chain of dangers, 10 miles in length by 3 miles in width, lying nearly midway between Jersey and Cape Carteret, and which are necessarily included in the Admiralty Chart of Jersey, now in course of publication, on a scale of 4 inches to the mile.

The spacious channel between this extensive line of reef and the island of Jersey has also been closely sounded, and many hidden dangers, hitherto unknown, have been discovered and placed on the Chart.

FOREIGN SURVEYS.—*Mediterranean.*—Captain P. F. Shortland, with an able staff of assistants, in H.M.S. *Hydra*, was employed in the early part of the last season in surveying the southern and eastern shores of Sicily, carrying the soundings off to depths of 2000 fathoms. Later in the year they were employed in sounding the Malta Channel; and in September, in consequence of an imperative necessity for a knowledge of the depths between Bombay and the Red Sea—in connexion with a Submarine Telegraph to India—the *Hydra* was detached from the Mediterranean for this purpose. She left Gibraltar in October, amply provided with all the necessary material, passed round the Cape of Good Hope, and reached Bombay in January; and, by the month of March, Captain Shortland having been greatly favoured by weather, most ably and successfully completed this important service, having obtained positive depths, and brought up specimens of the bottom at short intervals in a direct line from Bombay to the Kooria Moorria Isles, and thence to Aden.

The *Hydra* is now making a few additional investigations of the

bottom in the Indian Ocean, and settling some doubtful positions *en route* to England, after five years' foreign service, and will be replaced in the Mediterranean by the *Newport*, a small screw surveying-vessel, fitting out under Commander G. S. Nares.

*Strait of Magellan*.—H.M.S. *Nassau*, Captain R. C. Mayne, C.B., with several experienced assistants, has been employed in examining the approach to this strait, and its eastern portion, including the First and Second Narrows as far as Cape Negro. Great progress has been made in this work under considerable difficulties of climate and almost constant gales of wind, rendering it a harassing and often hazardous service for boat-parties. The great changes, however, which have been found to have taken place since surveys of nearly forty years ago—and the necessity of meeting the increased requirements of navigation, by this route to the Pacific, for large steam and iron-clad ships—are conclusive evidences of the usefulness of this undertaking. Among other changes the Sarmiento Bank, extending several miles off Cape Virgin, has undergone a material alteration in its character; and a pinnacle rock, with only 3 feet of water on it, and which had been undetected in former surveys, has been discovered at a distance of two miles from the cape.

*China Sea*.—Staff-Commander J. W. Reed, in command of the *Rifleman*, and a not over-strong staff of assistants, have been indefatigable in their labours among the reefs in the China Sea during the past season. No less than nine dangerous and extensive coral-reefs in the main route have been carefully examined, and added to the Chart immediately on their arrival at the Admiralty, as also the Sea-Horse Bank at the north-western end of the Palawan Passage.

The position of the doubtful "Holme's Shoal," in the fairway of that passage, has likewise been examined and found free from danger. A close and complete survey of Rhio Strait has been executed, and so far extended to the south as to include the islands of the Linga Archipelago, and the various channels leading to the Strait of Durian, as far south as the Island of Missana. The South Channel into Penang, which had undergone considerable change, has also been resurveyed.

*North China and Japan*.—Commander E. W. Brooker, in H.M.S. *Sylvia*, with a full staff of assistants, has during the past year been chiefly employed on the coasts of Formosa, of which, until now, our surveys have been of a fragmentary and imperfect character.

The *Sylvia*, in addition to the survey of the coasts and ports of Formosa, has searched for, and pronounced not to exist, Harp Island

and Alceste Rock on its southern and eastern sides, and has settled the position of Botel, Tobago Island, not hitherto correctly placed in regard to Formosa.

On the voyage to China, Commander Brooker visited the Andaman Islands and Cocos Group, for the purpose of rectifying the geographical positions of certain points reported to be considerably in error, and which he accomplished. He then carried a line of soundings along the Coast of Martaban, through the Strait of Malacca, and up the China Sea, from Saigon to Hong Kong, with a view to the requirements of submarine telegraphy between Singapore and China.

The *Sylvia* has also visited the Pratas Reef, as a preliminary step towards the lighting, by the Chinese Government, of that important position which has proved so fatal a danger to the navigation of the China Sea.

A valuable report on the lighting of the Coast of China between Hong Kong and Shanghai has also been furnished by Commander Brooker, and there is reason to believe that the Chinese Government, with the able professional aid of its English agents and advisers, are about to take up this important matter in earnest.

*The Serpent*, Commander C. Bullock, has been usefully employed on the coast of Japan, examining the anchorages on the east and west coasts of Nipon, with a view to the selection of treaty ports. Commander Bullock has surveyed the ports of Hiogo and Oösaka in the Inland Sea, and Nanao Harbour on the west coast, and examined the entrance to Kagosima Gulf and the coast about Cape Chichakoff; and has been generally engaged in correcting errors, getting soundings, and adding to our as yet partial knowledge of the coasts of that extensive country.

*West Indies*.—Staff-Commander John Parsons, with two assistants, is carrying on the survey of the British West India Isles by means of small vessels or boats hired on the spot. Owing to the inexpensive system pursued, the work necessarily progresses somewhat slowly; but in no part of the world has more elaborate or more accurate and perfect work been performed than in this survey.

A very complete Chart of the Island of Montserrat, closely sounded to the edge of the steep land which forms its base, has lately been received from Staff-Commander Parsons; and an equally careful survey of the Island of Barbadoes has been now commenced. Some interruption to the survey has lately occurred, in order to make an examination of the various channels among the Virgin



Islands to ascertain whether any serious changes had resulted from the late earthquake disturbances, which appears from the report of Staff-Commander Parsons, and other naval officers on the station, not to have been the case.

The surveys necessary to arrive at a conclusion respecting the selection of a station for the West India Mail Service, in lieu of St. Thomas, have also engaged the attention of our naval surveyors; and up to the present moment they are still occupied on this service.

It must not be omitted to mention that much valuable hydrographical information has been received from naval officers generally, both on this and other stations during the past year.

To Captain R. V. Hamilton, of H.M.S. *Sphinx*, especially, we are indebted for a close examination of the channel between the Island of Santa Cruz and the Virgin Group subsequent to the late earthquakes in that neighbourhood; upon which occasion he obtained a series of deep soundings, which were very valuable, and furnished as well an interesting paper on the subject generally.

Commander Charles Parry, of H.M.S. *Cordelia*, has also succeeded in obtaining deep soundings between Jamaica and Cuba. Information of this nature is always valuable, and especially at the present time, when it is likely to be turned to practical account by the connexion of Florida with the Southern Continent of America by means of the Telegraph Cable.

*The Gannet*, Commander W. Chimmo, in addition to her duties as a ship of war on the West India Station, has been principally occupied during the past season in continuing the survey of the Island of Trinidad and adjacent mainland, which important work will have been completed in a very perfect way by the middle of the present year. During the summer and autumn of 1867, the *Gannet* visited and explored a considerable stretch of the Labrador Coast, in the interest of the Fisheries; the limits of this coast, hitherto very inaccurately laid down, were correctly determined, and several harbours and anchorages carefully surveyed, to the great advantage of the seafaring population of Newfoundland, who annually resort to the fishing-grounds of Labrador.

*Newfoundland*.—Staff-Commander J. H. Kerr, with two assistants and a hired vessel, is steadily progressing with the coast survey of this colony.

During the summer of 1867 these officers rendered great assistance in procuring soundings and tracing out the best course for the

submarine cable between Placentia Bay at the south end of Newfoundland, and Cape Breton, in Nova Scotia; as also in ascertaining the position and assisting in the recovery of the Atlantic Cable eastward of Newfoundland. Subsequently the survey of the coast of Concepcion Bay and the examination of the dangerous rocky ground in the vicinity of Cape Freels and the off-lying islands was proceeded with.

*Bermudas.*—The examination, which was undertaken principally with the view of discovering the exact capabilities of the numerous narrow openings through the reefs of this group, and ascertaining the depth of water over the reefs generally, has been completed, and the survey discontinued.

*British Columbia.*—Mr. Pender, Navigating Lieutenant, and two assistants, have been employed in continuing the survey of the inner ship-channels between Vancouver Island and the northern boundary of British North-West America near Fort Simpson. This work, which is essential to the safe navigation of a very intricate region, has progressed very satisfactorily, and, when completed, will be of great benefit to our ships of war and to the future commerce of these colonies.

*Cape of Good Hope.*—This survey, which is being carried on principally by shore parties, aided by a ship of war when one can be spared by the officer commanding the station, is under the charge of Mr. W. E. Archdeacon, Navigating Lieutenant, and is now completed as far eastward as the Kei River, after long and laborious operations extending over many years. The whole of the coast from the Cape of Good Hope almost to the Kei River, a distance of 500 miles, is now published for the use of the seaman on a fair navigating scale, together with plans of every anchorage which is available between Simon's Bay and Natal.

*AUSTRALIA.—Victoria.*—The coast of this colony has been surveyed for some distance west of Cape Otway, with many additional soundings obtained off Ports Phillip and Western, and the survey is now being continued eastward between the latter port and Wilson Promontory. There has been some unavoidable delay in its progress, owing to the illness of Commander Wilkinson, which terminated in the death of that lamented officer in December last; by which sad event the navy has lost a most able and zealous officer, and the surveying branch of it one whose whole professional life had been conscientiously spent in its service.

*New South Wales.*—Captain Sidney and his assistants have made

their customary good progress with the survey of the shores of this colony. The coast-line between Sydney and Ulladulla, a distance of 112 miles, has been completed, together with the re-surveying of a great part of Broken Bay, and a plan of Jervis Bay, 80 miles southward of Sydney.

*South Australia.*—Commander Hutchinson and his two assistants have been employed during the past season on the coasts of Yorke Peninsula, which separates the Gulfs of St. Vincent and Spencer, and which, with the surveys of the anchorages of Ports Adelaide and Glenelg, makes up an amount of coast-line equal to about 160 miles.

*Queensland.*—Mr. Bedwell and his assistant have completed an entire re-survey of Moreton Bay, which was much required; and they have likewise completed the outer coast from Cape Moreton to Point Danger,—thus connecting the shores of the two colonies of Queensland and New South Wales.

*Red Sea.*—Consequent on the Abyssinian expedition, additions have been made to our knowledge of the coasts and reefs of the Red Sea between Aden and Annesley Bay; for, although no specially fitted surveying-vessel was available for this service, it has been ably performed by Captain D. Bradshaw, of H.M.S. *Star*, who was selected for the duty from his special qualifications.

The results of the labours of the Hydrographical Department during the past year have consisted in the engraving and publication of 56 new charts, and the revision of a vast number of original ones, and about 164,000 have been printed for the use of the naval service and the public.

Sailing Directions for the west coast of Scotland, coasts of France, Spain, and Portugal, 2 volumes of the 'China Sea Directory, Newfoundland, Labrador, the North Sea, and Australia,' have been published, as well as the Annual Tables of Tides, Lights, &c.

NEW PUBLICATIONS.—The *Society's 'Journal,'* vol. 37.—I have again to congratulate the Society on the punctual issue of the annual volume of our 'Journal' before the period of the anniversary, an admirable improvement on all antecedent practice, which is due exclusively to the zealous and untiring labours of our able Assistant-Secretary, Mr. H. W. Bates. The principal subjects contained in the present volume are:—Mr. Johnson's 'Report of his adventurous Journey across the Himalaya and the Kuen-lun to Khotan;' Dr. Mann 'On the Physical Geography and Climate of Natal,'—a truly



philosophical treatise on the subject, and founded on original observations; Colonel Tremenheere 'On the Physical Geography of the Lower Indus;' Professor Raimondi 'On a Portion of the Province of Carabaya in Southern Peru,'—an important contribution to the geography of this interesting region; Admiral Boutakoff's Memoir 'On the Delta and Mouths of the Amu Daria;' Lieutenant Bewsher 'On the Results of his Survey of a Portion of Mesopotamia, South and West of Baghdad;' Mr. Findlay 'On the last Journey of Dr. Livingstone,'—an able exposition of the geography of Central Africa, according to our present information, tending to show that Lake Tanganyika may be the ultimate source of the Nile; 'Notes on Eastern Persia and Western Beluchistan,' by Colonel Goldsmid; Kennedy's 'Report on an Expedition into Laos and Cambodia in 1866;' Dr. Haast's 'Altitude Sections across the New Zealand Alps of Canterbury Province;' and, lastly, Captain Godwin-Austen 'On the Pangong Lake District of Ladakh.' With the exception of the last-named, all these memoirs are accompanied by maps, mostly founded on original material supplied by the respective authors. On the geographical value of these memoirs it is needless for me further to dilate, especially as most of them have been read and discussed at our evening meetings, copious reports of which are published in our 'Proceedings;' but I may point out the large proportion which papers on physical geography, in this as in previous volumes, bear to those of mere description, as showing the importance we attach to the purely scientific aspects of our pursuit.

With regard to the numerous works published in various countries on subjects relating to geography, it is not my purpose, as I have stated in previous years, to pass them all in review in my annual addresses. According to established custom, I limit myself to a short notice of such as have fallen under my attention. Those who desire full information on current geographical literature will do well to consult that indispensable periodical, Petermann's 'Geographische Mittheilungen,' in which, from time to time, an article appears enumerating every work which has any bearing on geography, and arranged in classified order, according to countries.

*Major's Life of Prince Henry.*—I had occasion in my last year's Address to draw the attention of the Society to a remarkable work elucidating the comparative geography of Asia, by our associate Colonel Henry Yule, entitled, 'Cathay, and the Way Thither,' by which our acquaintance with the amount of knowledge of Eastern geography

possessed by our ancestors was vastly increased. I have this year to speak of another work of a similar character, which has recently been produced by our secretary, Mr. R. H. Major, in which a large number of entirely new points in the history of geographical discovery have been successfully established. It is impossible to open this book, which bears the title of 'The Life of Prince Henry of Portugal, surnamed the Navigator, and its Results,' without observing how great an amount of labour and patient research has been devoted to its preparation. Till comparatively recently the materials for such a work were not to be found in England; but, by the careful study of authentic contemporary documents, Mr. Major has brought into prominent relief the name and life of one till now too little known, but to whom, in fact, was due the discovery, within one century, of half the world. And it is in this aspect that this work has so much interest for our Society, since Prince Henry himself was the centre and source of all that activity in geographical discovery which made that period so remarkable.

Commencing with a description of the state of geographical knowledge in Prince Henry's time, and of the vague notions which prevailed respecting those unexplored regions which were bathed by the waters of the Sea of Darkness, Mr. Major leads us on through years of costly failure to the story of those wonderful discoveries which were made under the auspices of Prince Henry himself. In this portion of the work alone we are presented with an abundance of new material in the history of geography. The discovery of the Coast of Africa, from Cape Bojador to Sierra Leone, is given from the contemporary accounts of Azurara, Cadamosto, and Diogo Gomez; the first and last of which authors were previously unknown to English literature. Another original feature in the work is the circumstantial and conclusive refutation of a variety of claims set up on behalf of Genoese, Catalans, and Frenchmen, to priority in discovery of the Coast of Guinea. With respect to the important groups of islands in the Atlantic, we now for the first time learn that the Azores and Madeira group were discovered so early as the beginning of the fifteenth century by Genoese navigators in the service of Portugal, while for the Cape Verde Islands we are supplied with the name of an entirely new original discoverer, Diogo Gomez, in lieu of his supplanter, the Genoese Antonio de Nolli. The romantic story of the later accidental discovery of Madeira by the Englishman, Machin, which led to the exploration and colonisation of the island by Prince Henry's navigators, has now been definitely cleared from doubt, while the

complete history of the colonisation of the Azores is for the first time given in English. Still these are but incidents in comparison with the great 'Results' of the life of Prince Henry, which it is the real purpose of this comprehensive work to set forth. Within the small compass of a single century from the rounding of Cape Bojador, in 1484, we find more than one-half of the world opened up to man's knowledge by an unbroken chain of discovery, which originated in the genius and the efforts of this one man, whose name is all but unknown. The coasts of Africa visited—the Cape of Good Hope rounded—the New World disclosed—the seaway to India, the Moluccas and China laid open, the globe circumnavigated—and last, not least (for here I would take occasion to say that Mr. Major has made this subject peculiarly his own), Australia discovered. "Such were the stupendous results," to use Mr. Major's words, "of a great thought and of indomitable perseverance, in spite of twelve years of costly failure and disheartening ridicule. Had that failure and that ridicule produced on Prince Henry the effect which they ordinarily produce on other men, it is impossible to say what delays would have occurred before these mighty events would have been realised; for it must be borne in mind that the ardour not only of his own sailors, but of surrounding nations, owed its impulse to this pertinacity of purpose in him."

*Keith Johnston's New Atlases.*—Among the useful and important cartographical publications brought out by our Associate Mr. A. Keith Johnston, I have to mention the 'Handy Royal Atlas,' published this year, as a reliable work, giving the most recent discoveries by our travellers in Central Africa and Asia, and, for its size and form, easy to be consulted. I have also to notice with especial satisfaction the forthcoming issue by Mr. Johnston of a series of *Elementary Atlases of General, Physical, Historical, and Scriptural Geography*, which, being sold at extremely low prices, will, it is hoped, diffuse very widely much useful knowledge. The same indefatigable author is also about to issue during the summer a complete series of *Geographical Text-books*, arranged on a new plan, and in a style calculated to attract students, at the cost of a few pence each. Each map will have an accompanying handbook, so that the attention of the pupil or student will be limited to one subject at a time. These cheap and good scientific publications coming out now, when the better instruction of the people is so much advocated, cannot fail to be highly serviceable in popularising the study of Geography.



*Chapman's Travels in South Africa.*—Among recent publications, the narrative of Mr. James Chapman's Travels in South Africa, during a period of fifteen years, merits a commendatory notice on the part of geographers and naturalists. The ground he travelled over lies between Natal on the south, and the Zambesi River on the north, and from the Limpopo on the east, to Walvisch Bay on the west. Few persons occupied in trade as Mr. Chapman was could have given us such good sketches of the outlines of the country, and so many interesting details respecting the geology and botany of the wild regions he traversed. European readers may well be astonished to learn from Mr. Chapman, among the wonders of natural history which he witnessed, that in one district he walked 7 inches deep in a body of locusts, which devoured a cornfield in two hours. Many persons must doubtless be interested in the valuable contributions in various branches of natural history, whilst some of the sketches of the gorgeous scenes at and around the great Falls of the Zambesi, as executed by Mr. Baines, are telling adjuncts. I am pleased to see that the book has been well spoken of by able reviewers, one of whom, after recommending it to all who are interested in Africa, thus writes:—"As a traveller he has been adventurous and energetic, as a narrator truthful and modest; and it must not be forgotten that to such men as Mr. Chapman the gratitude of mankind is due." \*

*Millingen's Observations in Armenia and Kurdistan.*—A work has recently appeared in Paris, and in the French language, which from its title would be supposed to be simply of historical and political interest, but which, in reality, contains a considerable amount of geographical information concerning parts of the Turkish empire of which very little is known. The work is entitled 'La Turquie sous la Règne d'Abdul-Aziz,' and contains the experiences of the author, Mr. Frederick Millingen, during three years' military service in the eastern part of Armenia, or northern Kurdistan. The numerous details gleaned by this intelligent observer concerning the tribes of Kurds in that region will prove interesting to the ethnologist; and the map attached to the volume, in which the tract of country lying between the south-eastern shores of Lake Van and the Persian frontier is delineated, recommend the work to the notice of geographers. The chief utility of the map is, that the districts peopled by the different Kurdish

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\* 'Spectator,' April 11, 1868, p. 444.

tribes, together with the names of their numerous villages, are laid down from the personal observations of the author.

*Cornelissen's Treatise on the Temperature of the Sea off the Cape of Good Hope.*—One of those memoirs on oceanic hydrography which are so important and valuable for the bearing they have on practical seamanship, as well as on the generalizations of physical geography, has recently appeared in the publications of the Royal Meteorological Institute of the Netherlands, from the pen of Captain J. E. Cornelissen, of the Dutch Navy. The conclusions arrived at by the author—after tabulating the results of nearly thirty thousand observations of the temperature of the sea, systematically made by Dutch shipmasters—are, that the warm Mozambique current spreads out towards the south of the Cape, and that the cold South polar current drives it towards the coast of Africa, the two alternately encroaching on each other's domain; and that the various positions, during the year, of these oceanic streams are explicable only by the existence of a submarine reef or bank, between  $26^{\circ}$  and  $27^{\circ}$  E. longitude and between  $37^{\circ}$  and  $38^{\circ}$  S. latitude, having a gentle slope to the south, and a steep inclination on the north and north-eastern side. Similar observations have been made by English observers; and, indeed, the memoir of Captain Cornelissen should be studied in connexion with the important paper read before our own Society by Mr. Henry Toynbee, and published in the thirty-fifth volume of our Journal; the merit of the Dutch memoir consisting in the co-ordination of a vast number of observations, made in all seasons, and recorded in the logs deposited by the intelligent seamen of that nation in the nautical department of the Dutch Government.

*Jordan's Vis Inertiæ in the Ocean.*—Mr. Wm. Leighton Jordan, our Associate, has recently published a treatise on the action of vis inertiae in the ocean, a sequel to two former volumes on the elements as affected by the motions of the earth. In this work Mr. Jordan advances a series of propositions, carefully arranged, and based on the assumption that the waters of the ocean are acted on by the axial and orbital motion of the earth in a different degree to the solid matter of the globe; and, by his deductions, he accounts for most of the well ascertained currents of the ocean, and also infers that others yet undetected exist, by which the known circulation of the entire mass of waters is maintained. It is a subject of great difficulty, and one on which we are entirely deficient in data whereon to form a theory based on facts.

EUROPE.—*Spain*.—I am indebted to Don Francisco Coello, our able Honorary Corresponding Member at Madrid, for interesting details regarding the official surveys and the issue of Government maps in Spain, during the last year. In his communication he laments, as all men of science must do, the partial suspension of the great cadastral survey of the country, of which he was the director, and which employed a large staff of scientific men in working out, on a magnificent scale, the topography, hydrology, and geology of this imperfectly known part of Europe. Even the results of the preliminary surveys of the basins of the Douro, the Tagus, and the Guadiana, although finished in the same form as the Memoirs on the Ebro\* and Guadalquivir, which had previously attracted so much attention, have been suffered to remain unpublished. The only portion of this national work which lingers on is the survey by small parties of limited districts previously commenced, and the neighbourhoods of large towns. Since the suspension of geodetical operations, Don Francisco Coello informs me that the definitive calculations have been completed on the meridian and parallel of Madrid, and in other directions; and that the lines were being connected with the Portuguese triangulation on the one hand, and the French—at Biarritz—on the other. A line of levels had also been commenced, with a view to the accurate determination of the altitude of Madrid above the sea-level, which is still a matter of dispute, and, although this work has been stopped like the rest of the survey, many important points in the mountain-chains of the Peninsula have been accurately measured. Thus it has been finally ascertained that the Peak of Mulhacen, in the Sierra Nevada, is the highest point in Spain, being 11,423 feet high, and exceeding the Pic de Nethou, the highest point in the Spanish portion of the Pyrenees, which is only 11,168 feet. The altitudes of many other mountains, exceeding 2000 mètres (6561 feet), under the meridian and parallel of Madrid, have been also determined with similar accuracy.

In conclusion, our Associate informs me that a number of new charts of the Philippine Islands have been issued by the Hydrographical Dépôt of Madrid, and that the General Staff have published an Itinerary Map of Spain on a scale of  $\frac{1}{300,000}$ , in twenty sheets; copies of these maps are promised to our Society, and will be acceptable additions to our collection.

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\* See Anniversary Address, 1866, 'Journal,' vol. xxxvi., p. clxv.



*Switzerland.*—According to a report communicated by our esteemed Correspondent, Mons. J. M. Ziegler, the exact measurement of levels in Switzerland determined on as a consequence of Swiss participation in the European Geodetical Congress, and entrusted to those able astronomers M. Hirsch of Neuchatel and M. Plantamour of Geneva, has made progress during the year 1867. By these operations all elevations, previously hypsometrically determined, will be reviewed throughout Switzerland. So far the work performed by Swiss surveyors has contrasted favourably with that done in connexion with it by surrounding States, and has been complimented by the astronomer Hansen of Gotha, President of the Central Board. Probably as a consequence of the grandeur and interest of its natural phenomena, in few countries is the study of physical geography more cultivated than in Switzerland. As evidence of this, may be cited the number of maps and treatises which annually appear, relating to the different phases of this fruitful department of science. I am informed by M. Ziegler that, since the completion of the Federal Survey, the measurement of the Swiss glaciers was determined on; and that the first series of the results (the work of M. Kindig) has been published, comprising the glaciers of South-Western Valais. In connexion with this subject, and the conditions which influence the climate of their country, the Swiss Natural Science Society have offered a prize to encourage investigations concerning the warm southerly wind or *Föhn*. The same Society has a Meteorological Section, and it must be allowed that Switzerland offers many questions of interest to stimulate their inquiries.

ARCTIC RESEARCHES.—Having participated during many years in the efforts made by our Society to encourage Arctic exploration, it has been my pleasing duty, handed down to me by my eminent predecessor Sir John Barrow, to welcome and encourage every proposal which has been brought before us, tending to add lustre to the fame that the British nation has achieved in the delineation of the geography of a region which we have almost made our own.

For a number of years the hope was entertained that a passage between the Atlantic and Pacific Oceans, useful in commerce, might be realised; but, though the honour of effecting a transit by sea and ice was first accomplished by Franklin, who sealed his success with his life, and shortly after by McClure, and though many of their brave associates, from the days of Parry to those of McClintock,

have explored and laid down the forms of large islands constituting a large archipelago in these frozen climes, all hope of ever establishing a practicable sea-passage has vanished. For, by our researches we now know that, in any latitudes which we have searched, the Arctic Sea is beset with islands, and the intensity of the cold thereby so much increased, that the narrow passages between them are necessarily frozen, and impassable to ships.

Of late years, however, our interest has been awakened to the accomplishment of another great Arctic desideratum, or that of reaching the North Pole itself. As British geographers, we naturally supported this project, in the consideration that the nation which had already added so much to our knowledge of these regions should crown the work, by determining whether an open sea or land existed at the Pole itself. The project was warmly supported by zoologists, botanists, meteorologists, and physicists; and, fortified by the support of the British Association for the Advancement of Science, this Society urged the Government to employ a small portion of our great maritime force in settling this important question. If the most stirring eloquence could have prevailed, the Memoir of that distinguished Arctic explorer Sherard Osborn, read to us in 1865, should have induced any Board of Admiralty to countenance the effort we called for. But our rulers paused, chiefly because we, the Geographers, had not made up our minds as to whether the British efforts should be made by the way of Baffin's Bay and Smith Sound, or by Spitzbergen; our associates being divided in opinion. And even in regard to the Spitzbergen route, some believed that the expedition ought to proceed between that island and Nova Zembla, and others preferred coasting along the east and north shores of Greenland. Hence the refusal of the Admiralty to sanction any expedition in 1865, though Osborn had clearly pointed out the small amount of exploration, comparatively speaking, which remained to be accomplished in solving the desired problem.

Recently the subject—which, though dormant, has never been abandoned by us—has been revived with vigour in Germany, entirely through the energy and skill of our Medallist Dr. Petermann, who, warmly advocating the voyage by Spitzbergen, has at his own risk fitted out a Norwegian yacht of 80 tons, the *Germania*, commanded by Karl Koldewey, which sailed probably to-day from Bergen in Norway, and will proceed to lat.  $74\frac{1}{2}^{\circ}$  N., along the eastern coast of Greenland. The French, also, have been roused by the appeal of a zealous young naval officer, Lieutenant Lam-

bert, to fit out an expedition to enter the Arctic Seas by Behring Strait; and, finally, we have once more been stimulated by Sherard Osborn to go forward in the cause he has so much at heart. Whilst in his last communication he gave many strong and good reasons for preferring, as heretofore, the route by Smith Sound to any other line, he is, I know, above all desirous that we should lie no longer on our oars, but that, at the latest in the ensuing year, whichever route may be preferred, something should be done in reopening this fine school for the training of hardy and adventurous seamen.

In his last Memoir, Captain Sherard Osborn gives great credit to the views of Dr. Petermann, who has indeed justly entitled himself to our warmest acknowledgments for the sagacity and talent with which he long ago deduced the existence of those northern lands, and laid them down in his maps from the evidence of the Russian explorers, and recently again examined by way of Behring Strait. At the same time the results of the inquiries of the Swedish expedition at and around Spitzbergen are, as Osborn thinks, antagonistic to the success of any effort in that direction.

Whilst such are the preparations and hopes in European countries, a great amount of fresh knowledge has been obtained by our American kinsmen, who in their whaling-vessels have pushed their enterprise through Behring Strait, far beyond the land first sighted by Kellett, and beyond  $73^{\circ}$  N. lat. have coasted extensive high lands which lie off the coast of Siberia, from which they are, it is thought, separated by the sea first seen by Wrangell. These, indeed, are great advances since the days when Collinson (whose discoveries in another direction have never been surpassed) determined the outline of the whole northern coast of America, and Kellett first saw Herald Island.

One of these masters of American whalers—Captain Long—has communicated to the 'Pacific Commercial Advertiser of Honolulu,' a report which, in giving a lively sketch of the progress of Arctic discovery from the days of Hudson and Frobisher, has enunciated the opinion that, if ever a transit by water be made between the Eastern and Western Oceans, it will not be by lines hitherto tried, but by an enterprise directed from Behring Strait.

Looking to the fact that the Arctic Sea is bounded by North America, Greenland, Spitzbergen, Nova Zembla, and Siberia, and that it is the recipient of the enormous bodies of water poured into it by many large rivers, he infers that the surplus must be mainly



discharged either by Spitzbergen or by Smith Sound and Baffin's Bay. Now, all navigators who have endeavoured to get towards the Pole by these lines have, he says, always met with a powerful outflow of water transporting and moving out the ice southward into the Atlantic. Thus it was that Parry, having proceeded with great perseverance in sledges 292 miles northwards, and having reached lat.  $82^{\circ} 45'$ , was only 172 miles from his starting-point, so steadily had the broken ice been carrying him and his party southwards by this great channel. Considering that the same outflow of water and ice has been met with by all explorers to the north of Smith Sound, Captain Long maintains that Behring Strait stands in favourable contrast to the other openings into the region of the Polar Sea, and is the channel in which the effort should be made. He affirms, from experience of whalers since 1847, that no great body of water finds its way south through Behring Strait; and that, at least in the spring and summer, the current is always found setting to the north, owing, as he infers, to the discharge of the rivers on the North American shore and that of the Anadyr on the Asiatic coast. He suggests, therefore, that a strong vessel of from 200 to 300 tons' burthen, and provided with sufficient steam-power to get through temporary obstacles, should follow the Asiatic shore from Behring Strait as far as Cape Kekurnai or Cape Schelagskoi. From some point between those capes the course would be to the north of the Laachoo Islands, whence the course towards Spitzbergen or the Pole would be influenced by the currents proceeding from the great Siberian rivers. If the vessel were obstructed by ice to the north of these islands, the outflow current, though not so strong as immediately to the north of Spitzbergen or in Baffin's Bay, would, he thinks, eventually carry the ship through one of the channels into the Atlantic.

Another route by which the voyage might, in the opinion of Captain Long, be accomplished, is to proceed from Behring Strait to the mouth of the Lena, then directly north beyond Cape Sievero Vostoschni, and then westwards towards Spitzbergen.

The letter of this experienced whaling captain is highly entitled to the notice of all persons interested in Arctic exploration, inasmuch as he assigns strong grounds for believing that hitherto we have been toiling like Sisyphus against natural obstacles; he believes that notwithstanding a few minor difficulties on the Siberian coast, if we once get a stout but small vessel into the current caused by the Yenissei and other great Siberian streams, that she would,

if entangled in the pack, be unquestionably carried forward into the Atlantic.

Captain Long concludes that the passage from the Pacific to the Atlantic Ocean will eventually be accomplished from Behring Strait by one of the two routes which he has indicated, and adds, "I have as much faith in this as I have in any uncertain future event, and much more than I had fifteen years ago in the Atlantic telegraph."

Irrespective, however, of this possible but useless transit from the Pacific to the Atlantic, a fourth plan by which the North Pole may be reached has been recently brought under my notice by an experienced captain of a British whaler, David Gray, and which he thinks has many advantages over the three routes by Smith Sound, Spitzbergen, or Behring Strait. Writing to me on the eve of his departure for his usual fishing-station, off the east coast of Greenland, he maintains from his long observations of the tides, the set of the currents, and the state of the ice in that region at various seasons of the year, that there will be little difficulty in carrying a vessel in *a single season to a very high latitude, if not to the Pole itself*. He proposes to take the ice at about  $72^{\circ}$ , where there is a deep bight running towards Shannon Island, and thence he could follow the continent of Greenland as long as it trended in the desired direction, and afterwards push through the loose fields of ice, which can be easily penetrated, as proved by Scoresby, Clavering, and Sabine.

This project is supported by numerous good observations; among which the rarity of icebergs in those wide seas, probably affected by the warmth of the Gulf Stream, in comparison with their abundance in the narrow strait of Smith Sound, would seem to give to his route a decided advantage over that on the west coast of Greenland. Another advantage is, that the ice on the east coast is field or floe ice, which is always in motion even in winter, as proved by ships that were beset as far north as  $78^{\circ}$ , being driven down during winter and autumn to Cape Farewell. Adducing other reasons for preferring this route, Captain David Gray believes that an expedition might reach Shannon Island in fourteen days, and would be in its field of operation six weeks sooner than if it were sent to Smith Sound; and therefore that a vessel sailing in June would have before it for research the greater part of July, all August, and the half of September, in which time the object might be accomplished. Failing of this, and it being necessary to winter, there are, it is

said, many bays and good harbours on the east coast of Greenland which are available, where, according to the indications observed, there seems to exist an average amount of animal life compared with other Arctic districts. I refer you to Captain David Gray's sensible letter on this subject, which will be published in our 'Proceedings;' and in the mean time it is highly gratifying to know that the German, or, as it may be truly called, the Petermann Expedition, which is to sail to-day from Bergen, is about to proceed on the same line as that advocated by the experienced whaling commander Captain David Gray.

Before I dismiss the subject of Arctic researches I must state that I have recently been informed by Professor A. E. Nordenskiöld, of Stockholm, that the Swedish Government are preparing to make, during the approaching summer, an attempt to advance into the Polar Sea beyond Spitzbergen. A powerful screw-steamer, expressly built for winter navigation, has been granted for the purpose, and is to be provisioned for twelve months. Already the Swedish Government have gained honour by their encouragement of successive expeditions to Spitzbergen for the measurement of an arc of the meridian, and the scientific exploration of the islands, in which Professor Nordenskiöld took part; that success may attend the present enterprise must be the prayer of all Geographers.

BRITISH NORTH AMERICA.—In an able review of the Memoir read by Mr. Alfred Waddington, during the present session, "On the Physical Geography of British Columbia," Dr. Cheadle has recently given\* us a very suggestive forecast of the probable future of our North American Colonies, if those on the Pacific, so rich in coal and gold, be not speedily connected with those east of the Rocky Mountains and with Canada. Coming from the fellow-traveller of Lord Milton, who three years ago called public attention to the important subject of a north-west passage by land, I am happy to see Dr. Cheadle coincides with me in assigning great praise to Mr. Waddington, for the perseverance and intelligence with which he has promoted, at great pecuniary sacrifice, the exploration of British Columbia during many years, and for having been the first to indicate the best line of route between the Leatherhead Pass of the Rocky Mountains (described by Dr. Rae, Lord Milton and Dr. Cheadle), and Bute Inlet on the Pacific. It is manifest that the

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\* 'Pall Mall Gazette,' April 15, 1868, p. 3.



present isolation of the Pacific colonies from the rich countries watered by the Saskatchewan and the Red River is greatly to be lamented, and it is evident that if British North America is to be preserved in its entirety, a strong imperial will must be exerted and considerable expenditure incurred in the construction of lines of communication between our widely-separated provinces, which otherwise will be absorbed one by one by our energetic neighbours of the United States, commencing with the most readily accessible, the Red River Settlement.

CENTRAL AMERICA.—*Isthmus of Darien*.—Our attention has been directed, during the present session, to the ever-recurring and important subject of new lines of transit and projects of ship-canals across the great American isthmus. At one of our evening meetings, our enterprising associate, Mr. John Collinson, gave us an interesting narrative of his preliminary survey (in which he was accompanied by Lieutenant S. P. Oliver) across the unknown eastern part of Nicaragua, undertaken with a view to the selection of a line for a railway across the country, to terminate at Pim's Bay on the Atlantic side, and Realejo on the Pacific. The highest point of the line surveyed was found to be only 748 feet above the level of the Atlantic, and 620 feet above that of Lake Nicaragua; and the country, except for a few miles near the lake, was covered with the dense and lofty virgin-forest, which is characteristic of the lower levels in Tropical America.

The most easterly part of the American isthmus—the Isthmus of Darien—is that which has always presented the greatest difficulties to the explorer. The terrible sufferings of the survey-parties sent out to explore the line of the Savannah River and Port Escoces, fourteen years ago, when several members of the expedition perished of hunger in the trackless forests, must still be fresh in the memory of many persons. Notwithstanding, however, the failure of all previous attempts to cross the isthmus, M. Lucien de Puydt, under the auspices of the French Government, has devoted himself during the last few years to the examination of this difficult country. In 1861 he explored the line of the River Lara and Chuquanaque, and penetrated as far as was possible by water towards the sources of the River Tuyra; and believing that he then saw the chain of the Andes in that direction broken up into isolated hills, with two passes between them, revisited the district from the eastern or Atlantic side in 1865, and succeeded in reaching one of these passes, which he declares to be not more than about 120 feet above the sea-

level. The district of M. de Puydt's later exploration is one of the least known of the Isthmus of Darien, lying along the course and near the sources of the Tanela River, which disembogues in the Gulf of Uraba. Although we may regret the insufficiency of the observations of altitudes taken by the traveller,—and he describes his exploration as only preliminary to a more perfect survey,—the Memoir communicated to us by M. de Puydt must be admitted to contain much information on the geography, ethnology, and productions of a region hitherto almost unknown.

Before quitting the subject of the Isthmus of Darien, I have to record that a most useful volume on the subject of interoceanic transit has been published by Admiral Davis, of the National Observatory, Washington, which contains an outline of nearly all the various projects for connecting the two oceans, copiously illustrated by maps.

SOUTH AMERICA.—Last year it was my pleasing duty to record the continuation of the important explorations of the Purus and its tributaries by our associate and medallist, Mr. Chandless, which added so much to our knowledge of South American geography. Although I have not, on the present occasion, to bring to your notice any fact of such striking interest as this, much has been done in the investigation of the other great rivers of the Amazons basin, chiefly through the Peruvians, who have lately made strenuous efforts to explore the rivers in their eastern territory, with the view to the opening of new lines of communication. The reports of Peruvian officers engaged in these fluvial explorations have been published in the official Gazettes of Lima; but have not, as far as I am aware, been translated into English, or made known to the scientific public in Europe.

The expedition up the Ucayali and Pachitea rivers, which I noticed in my last year's Address as having succeeded in proving the navigability of these tributaries of the Amazons to within 325 miles of Lima, has been followed by a survey of the land-route between the head of the navigation and the city of Huanuco, in the inhabited parts of Peru. A brief account of this survey has been sent to our Society by our Corresponding Member, Don M. Felipe Paz Soldan, accompanied by a tracing of the map of the route, which will be interesting to English geographers, delineating the unexplored country into which our travellers Smith and Lowe found it impossible to advance in 1834. The port which is to be the future

place of embarkation at the foot of the Andes, for the voyage to Europe *viâ* the Amazons, has been named "Puerto General Prado" after the President of Peru; and is situated at the junction of the River Mayro with the Palcazo, more than 3600 miles distant from the Atlantic. The survey was executed by a Hydrographic Commission, under the direction of Admiral Tucker, a North-American naval officer, now in the Peruvian service; and all the principal points on the line have been fixed by astronomical observation. Profile sections of the route accompany the map, and we are promised a narrative of the expedition as soon as it is ready.

Another important undertaking has been the exploration of the River Javari in 1866, by a joint Frontier Commission of Peruvians and Brazilians. In all maps this tributary of the Amazons is represented as running from south to north, and it had been fixed upon in the last century as the boundary line, in this direction, between the colonial territories of Spain and Portugal; but the result of the recent exploration has been to show that the general direction of the stream is for several hundred miles south-east to north-west, or nearly parallel to the Amazons, and that it has numerous abrupt windings. A report of the survey has been sent to us by Don Manuel R. Paz Soldan, nephew of our Lima correspondent, who was the Peruvian Commissioner; but a great part of the journals and observations, as well as the instruments, were lost in a murderous affray with the wild Indians of this dangerous region,—a hundred savages armed with bows and poisoned arrows having suddenly attacked the party in a narrow part of the stream, walled-in by high forests, and killed the Brazilian Commissioner, besides wounding five others, including Señor Paz Soldan himself. The expedition had thus to turn back, leaving their large vessel in the hands of the Indians, and escaping in a small boat. The author of the Report speaks of the wide extent of fertile country watered by the Javari and other rivers, still unknown, and likely long to remain so, on account of the ferocious nature of its inhabitants.

The River Morona, an affluent of the left bank of the Upper Amazons, near the limit of navigation, was explored last year by the steamer *Napo*, under the command of Captain M. A. Vargas. The country on both sides of this little-known stream is scantily peopled by Indians, who obtain gold, for barter with white traders, with the greatest facility, by washing the sand of the beaches in the rudest manner. Captain Vargas observed the method of working, and obtained samples of the gold, which is of fine quality, and he



concludes his interesting report by expressing the opinion that the valleys of several of these northern tributaries abound in gold, the search for which will soon attract a large population.

Our indefatigable associate Professor Raimondi continues without interruption his valuable explorations of the Andean valleys of Central Peru, and has recently examined the course of the River Pulperia, an affluent of the Apurimac,—a journey undertaken with a view to ascertaining how far up the latter river was navigable. His memoir on this subject, which we have already received, like the previous one published in the last volume of our 'Journal,' abounds in interesting observations not only of the topography, but also of the physical geography and botany of this previously unknown district.

In other parts of South America there is little to record, except that Captain Burton has recently returned to his Consulate at Santos, after a journey of seven months through the interior of Brazil, and down the River San Francisco. His report of the journey may be shortly expected, and, being from the pen of so experienced and able a traveller, it cannot but contain much that will be new and interesting.

AUSTRALIA.—The chief additions to our knowledge of Australian geography have been made, as in the previous year, by small expeditions from the outskirts of the populated districts, undertaken to discover new lands suitable for settlement. In this way we are gradually becoming acquainted with the interior portions of Queensland and Western Australia. Under the enlightened encouragement of Governor Hampton, in the latter colony, much useful knowledge of the country between Nickol Bay and the Tropic of Capricorn has been obtained by parties under the leadership of Mr. T. C. Sholl, who has established the identity of the Ashburton with the Curlew River, and discovered several new streams flowing towards Exmouth Gulf.

Discoveries of some importance have been made in 1867, in the northern territory belonging to the colony of South Australia. After the failure of the Adam Bay settlement, the enterprising Government of Adelaide despatched Captain Cadell in a steamer named the *Eagle*, to explore the coast between the mouth of the Adelaide River and the Gulf of Carpentaria, previously imperfectly surveyed by Flinders and afterwards by Stokes, with a view to the discovery of some better site for a settlement than Adam Bay. The

*Eagle* left Sydney on the 29th March, 1867, and on arriving at the Gulf of Carpentaria examined all the inlets, commencing from the west of the Queensland frontier. Proceeding northward along the western shores of the Gulf, Captain Cadell discovered, first, a moderate-sized river in lat.  $14^{\circ} 27'$ ; afterwards, in lat.  $12^{\circ} 33'$  and long.  $136^{\circ} 55'$ , another river flowing into a fine haven of some 50 square miles' area; and again, on the western side of the deep gulf in which lies Arnhem's Bay, the mouths of three large rivers disemboguing in a deep bay, 20 miles in length by 10 in breadth, in a part of the coast hitherto represented on charts as dry land. Two of these rivers had 5 fathoms of water on the bar. The new bay was named Buckingham Bay, in honour of the Duke of Buckingham, the present Secretary of State for the Colonies. Another fine river was discovered about 30 miles to the eastward of the Liverpool, by Mr. H. B. Bristow, the chief officer in command of a boat-party. He proceeded 60 miles up the stream, and found the depth all that distance 4 fathoms, at low water, the width being 200 yards; the entrance to the river is  $2\frac{1}{2}$  miles wide. Natives were numerous on the shores of the river; and indeed the whole coast, which is fringed with islands, was found to be thickly inhabited. As a result of this exploration, Captain Cadell gives the estuary of the Liverpool River as by far the best site for a settlement in this region.

*Central Asia and Western China.*—For some years I have, in my Anniversary Addresses, directed attention to the grand and impassable mountain region lying between the Central Asiatic countries occupied by the Russians and our great Empire of India. In confirmation of the views I have entertained, I now refer you to the able and sound views on this subject, which are contained in the article of the last number of the 'Edinburgh Review' headed "Western China." In Eastern Turkistan, and in the great province of Yunan, the authority of the Chinese has been swept away, and the insurgent Mahomedans have established independent governments. From Eastern Turkistan the insurrection has spread also over the provinces of Khansa and Shansi, and even in the Szechuen districts bordering on Thibet. So, in the expressive language of the writer, "we really have before us grounds to surmise that this remote part of the world may at present be the scene of a great Moslem revival." We learn from our Associate Colonel Yule, that, even in the 13th century, Marco Polo found in the chief

city of Yunan, the westernmost province of China, a mixed assemblage of idolaters, Saracens, and Nestorian Christians; and the recent rise and spread of the Mussulman element is graphically told by the author of the article in question. By this last revolution, indeed, all the overland trade between British Burmah and China has been stopped, and some time must elapse before any commercial intercourse can be safely established with the new rulers. The great interest of the article I refer to consists in the condensed description of the internecine conflicts between the former governors, the Chinese and the Mussulmen, who have expelled them, and subsequently of the frequent battles and disturbances of the latter among themselves, now that they are unquestioned masters of all Eastern Turkistan, including the cities of Yarkand, Kashgar, and Khotan.

The most important of the leaders of these Mussulmen is Yakoob Kooshbegee of Khotan, now the ruler of all Eastern Turkistan, with whom the adventurous explorer Johnson, of the Trigonometrical Survey of India, came into communication, as recorded in our 'Proceedings.'

Although as anxious as any one to gain fresh geographical knowledge, I dissent from the views of those of my contemporaries, who, overlooking all obstacles where British *prestige* and power are to be extended, have blamed Sir John Lawrence for having discountenanced such excursions. I must record it as my opinion that the Governor-General of India has acted most wisely in abstaining from intercourse with these bellicose and unsettled Free Lances beyond the British frontier, whether they lie in Affghanistan on the west, or at Khotan and Kashgar on the north. At the same time, as President of this Society, I shall rejoice if the recommendation of the Expedition Committee of our Council be adopted, and that the able young Indian officer, Lieut. Hayward, who has already penetrated in sporting excursions to the north of the Hindoo Kush, should proceed, as an unauthorized individual, to the regions north of that mountain range, and define the flanks of the Pamir steppe, thus clearing up some of the problems in the physical geography of Central Asia.

Having during some years endeavoured to lead my associates to believe that the invasion of our Indian empire by Russia was a mere chimera and a political bugbear, so when I see a few thousand Cossacks gradually establishing order in Western Turkistan, and gradually gaining ground eastwards from the Syr Daria, I rejoice



to find that many of my countrymen no longer look with apprehension to their advances, but rather hail them as establishing settled government where all was previously chaos. In a word, the able reviewer to whom I have alluded, and who was for some time an efficient public servant in India, has thus written in regard to the grand and impassable mountains which happily separate British India from Turkistan:—"As for the security of the British empire, even the wildest of the Russophobists has not yet conceived the possibility of an invasion by the way of Karakorum." And when we consider that the Russian forces, which have now extended along the Syr Daria to Tashkend, do not exceed eight or ten thousand men in the remote provinces they have brought into order, and that they are separated from their great centre of supply by many wild and sterile countries, I trust we may hear no more of this phantom.

BRITISH BURMAH.\*—I may now profitably call your attention to a region which has received less of the attention of geographers than it deserves, as will be at once seen in the following short statement which I obtained, a few days before his death, from my friend Mr. John Crawford, who was personally well acquainted with a large portion of the country. This is that part of our vast Indian dominion which in official language is called British Burmah, and on which admirable periodical reports have been made by the able men who have administered the government of this new country since the more important part of it came into our possession. These men are Sir Arthur Phayre, for many years the Chief Commissioner there, and at present his worthy successor Colonel A. Fytche. What has been accomplished in a few short years will appear from the following account of the present state of the province:—

The territory is composed of the ancient divisions of Pegu in the centre, Arracan to the north, and Tenasserim to the south, and is wholly tropical, extending from about the eleventh to the twenty-first degree of latitude, and has a computed area of 90,000 square miles, which make it some 6000 square miles larger than Great Britain. The eastern shore of the Bay of Bengal, over a vast line of 900 miles, forms its western boundary; and along this line there are, in contrast to the absence of harbours which characterises the

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\* This portion of my Address, the work of my deeply lamented friend John Crawford, is the last of the many proofs I had of his willing co-operation.

western shore of the same bay, four good ones, being the embouchures of as many rivers; one of which, the Irrawady, is navigable by steamers for 500 miles.

We have in British Burmah a country in almost all respects widely differing from India, inhabited by a distinct race of men, differing from Hindus in language, in religion, and in manners. India is a thickly-peopled, and in many places even an over-peopled one, while Burmah is everywhere under-peopled. There is no room in India for that immigration which our territory in Trans-Gangetic India loudly invites. In 1861-2, the population of British Burmah was 1,897,807, and in 1866-7, or in five years' time, it had increased to 2,380,453, or 23 per cent., arising for the most part from emigration from the misgoverned native provinces bordering on it. The great majority of the inhabitants are natives of the country, but we have in this population also about 100,000 Hindu and Mahomedan settlers from India, and above 10,000 settlers from China. In the last year of the Return, the numbers of immigrants amounted to no fewer than 76,869. The ratio of population to land in British Hindustan ranges from 150 to 500 to every square mile; whereas, in our Trans-Gangetic province, it is little more than 25, or one-sixth of the lowest, and one-twentieth of the highest, density of India. As a resource for emigration, then, Burmah is to India what America and Australia are to England.

The two staple products of British Burmah point at the nature and quality of the country. They are rice and teak timber; the first the main cereal everywhere of the tropics, and the last the only timber that equals, if it does not indeed excel, British oak. The export of rice, in 1865-6, amounted to 6,089,700 cwt., of the local value of 1,825,209*l*. Of this corn, British Burmah is the largest exporting country in the world—an advantage which it owes to the abundance and suitableness of its land, and the favourable nature of its climate, and more especially to the 10,000 square miles of alluvial soil which constitute the deltas of its great rivers. Before the British accession all export of rice was forbidden.

The teak forests of British Burmah are by far the largest in India, but the supplies which we obtain from the foreign states of Burmah, Siam, and other countries, and which pass through our territory for a market, are still larger than our own. In 1865-6, 14,000 logs of teak were imported from foreign countries, and 24,178 loads, of the value of 144,540*l*., were exported chiefly to form the backing of English "iron shields."

Mr. Crawford added to his instructive commentary on British Burmah some valuable, and it seems to me well-founded, objections to the attempt to establish a railroad between Rangoon and the western Chinese province of Yunan. He showed that this province, the poorest of the empire, is almost entirely inhabited by Mahomedans who are now in insurrection; and besides this there lies a vast country between British Burmah and the Chinese frontier, which is occupied by wild, lawless, and independent tribes. Hence it is that at the present day the raw silk from China, which formerly was brought overland, now comes to Rangoon much better and cheaper after it has gone over the China Sea, through the Straits of Malacca, and up the Bay of Bengal—a voyage of some 3000 miles.

If, however, the project of a railroad from Rangoon to China is not to be thought of, the local authorities of British Burmah, supported by the commercial community, have submitted to the Supreme Government of India the project of a guaranteed railroad, which, from its national, practical, and moderate character, is well entitled to favourable consideration. It is to be wholly within British territory, and to run over the most fertile and populous portion of the province, comprising a distance of 180 miles; one terminus being the port of Rangoon, a town of 70,000 inhabitants, and the other Prome, near our northern frontier, a town with a population of 22,000.

*Tibet and Lhasa.*—We have received during the past year, through the enterprising but well-considered arrangements of Captain Montgomerie, who is now in executive charge of the Great Trigonometrical Survey of India, a most valuable accession to our knowledge of the geography of the Trans-Himalayan regions. This officer, finding it impossible to employ his English assistants, either with safety or advantage, beyond the dominions of our ally the Maharaja of Cashmire, proposed to educate intelligent natives for the purpose of extending exploration to the northward, and thus enlarging the scope of his survey. His proposal met with the approval of the Government; and, if we may judge from the success of the two first experiments that have been made, it is likely to lead to the most important results.

At our last Anniversary it was announced to the Society that one of Captain Montgomerie's native assistants, a Mahometan who had acquired a competent knowledge of the use of scientific instruments, had penetrated from the Karakorum Pass to Yarkand, determining for the first time the true astronomical position of that town, and



connecting it through a well-executed route-survey with our trigonometrical operations in Thibet. I have now to notice a still more important achievement, for which we are indebted to Captain Montgomerie's judicious encouragement of native talent, and which has attracted much attention both in India and England. The extensive plateau beyond the crests of the Himalaya, which stretches west and east from Mount Kailas and the Mansarowar Lake to Lhasa in Great Thibet, has never been visited by Moslem travellers; and although, a century and a half ago, a Catholic missionary of the name of Hippolito Desideri did traverse the entire distance in his journey from Cashmire, *viâ* Ladak to Lhasa, he has left no information of any value with regard to the geography of the country. The interval, therefore, upon this line between the Mansarowar Lake and the great monastery of Teshú-Lúmbú near Lhasa, which was visited by Warren Hastings's envoys—Mr. Bogle and Major Turner—was regarded as a sort of *terra incognita*; and was thus judged by Captain Montgomerie to be particularly deserving of his attention. He employed accordingly two brothers, intelligent young Brahmins, who had been fully instructed in the use of surveying instruments, to explore this region. They proceeded from India by way of Nepaul, and, after numerous failures, one of the two succeeded in eluding the vigilance of the Thibetan officials, and obtaining access to the country. With marvellous address and no little boldness and energy, this individual—now generally known as Captain Montgomerie's Pundit—penetrated from the Nepaul frontier to the city of Lhasa, and subsequently returned from that city along the banks of the Brahmaputra to the source of that river in the Mansarowar Lake; from whence he crossed the Himalayas to the plains of India, leaving his brother, whom he had rejoined on the Indian frontier, to continue the survey from the lake to Ladak.

Throughout this long tract, a distance of over 800 miles, we are now, therefore, in possession of a continuous route-survey, verified by astronomical observations, at a number of intermediate points, and rendered still more valuable by reliable information regarding the climatology and physical geography of this hitherto almost unknown region. That the Pundit, while maintaining his disguise, should have been able, amid a watchful and suspicious people, to keep upon so long a line a careful road-book with a full record of bearings and distances, and a very extensive register of observations, is certainly no ordinary feat; and reflects infinite credit, not only on the individual employed, but on Captain Montgomerie's judgment in selecting

him for the duty. The Society will further be glad to learn that the Council have awarded a Gold Watch of the value of 30*l.* to the Pundit, in commemoration of his courage, ability, and address, and to mark their sense of the value of the services which he has rendered to Geography.

COAL AND GOLD OF SOUTH-EASTERN AFRICA.—The colony of Natal seems to be destined to rise into considerable importance, if the coal, which is there plentiful, particularly in its north-western parts, should be rendered useful by the construction of railroads to convey it from the interior to the towns of Pieter Maritzburg and Durban. I have reason to think that this coal was formed in Palæozoic times, and is of the best quality. In order to determine its extent and by what means it can be best worked and transported, I have, on being consulted, recommended Her Majesty's Government to send out a competent mining engineer to report upon the most efficient steps to be taken in order to work out this important problem; for, independently of the establishment of local manufactories which the possession of coal would bring about, the capability of supplying our steam-vessels and packets with fuel upon the east coast of Africa would be a notable advantage. I have been much interested in tracing the various positions occupied by this coal upon the map of Natal, prepared by the colonial surveyor, Dr. Sutherland, as well as on a large map drawn out by our associate Dr. Mann, who so well represents the interests of this colony in Europe.

The existence of another source of wealth in an adjacent region on the north-west, commonly known as the country of Mosilikatse, has recently thrown the colonists of Natal into a state of great excitement. In that part of the interior, to the north-west of the Transvaal Territory, hitherto chiefly noted for its ivory and ostrich feathers, gold has been discovered in considerable quantity.

Mr. Carl Mauch, to whom we are indebted for the realization of this fact, and, of whom we first heard through the newspapers of Natal and the Cape of Good Hope, has really proved himself to be an explorer of considerable merit, both as a geographer and a geologist. Having been in frequent communication with our Medalist Dr. Petermann, I gather these data from a forthcoming number of the '*Mittheilungen*,' to which I have had access:—Leaving Trieste in 1863, he has been travelling in South Africa since 1865. Having traversed and examined the Transvaal Territory, of which

he constructed a map, he became acquainted with Mr. Hartley an elephant-hunter, who, in quest of ivory, had visited all the highest lands of the region which forms the broad-backed lofty watershed between the rivers Zambesi, on the north, and Limpopo on the south. Being informed by Hartley of the existence in these high and rocky lands of the relics of ancient metalliferous excavations, Mr. Carl Mauch explored them, hammer in hand, and in two separate localities\*—the one in s. lat.  $20^{\circ} 40'$ , and on an affluent of the Limpopo, the other on an affluent of the Zambesi, about 40 miles south of Tete—he discovered rich auriferous white quartz-rocks, embayed in a variety of ancient crystalline rocks, whether hard slates (probably Silurian) or various igneous rocks, including a great predominance of granite and diorite. The loftiest part of this elevated tract being 7000 feet above the sea, and lying in s. lat.  $19^{\circ} 50'$  and E. long.  $28^{\circ} 35'$ , presents in parts great accumulations of these broken masses of granite, to which my illustrious friend the late Leopold von Buch assigned the appropriate name of “Felsen Meer,” or a sea of rocks. Many travellers have too often erroneously considered these to be boulders, whilst in fact they are simply the results of decomposition *in situ*, as seen in many granitic countries.

The auriferous quartz-rock, which in places is still seen to rise a few feet above the surface, has, where rich in gold, been quarried down in open trenches to the depth of 6 feet or more. These works seem to have been abandoned simply from the influx of water, and in one spot the traveller detected the remains of smelting operations with slag and scorïæ, the relics of lead-ore being also observable.

Of the auriferous localities described by Mr. Mauch, that which lies to the north, on a tributary of the Zambesi, is the most sterile, and this fact explains why the Portuguese have never made much of it; Dr. Livingstone having only spoken of small quantities of gold-dust being washed down in the rivers to the south of Tete.

On the other hand, the existence of the rich tract on the river Thuti, or Tuti, an affluent of the Limpopo, and the proof of old works having been in operation there, greatly favours the suggestion I am about to offer that the Ophir of Solomon was probably near the mouth of that great stream. In the mean time the discoveries of Mr. Mauch have awakened the interest of many of the colonists of

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\* In the original map of Mr. Mauch, which Dr. Petermann has submitted to my inspection, a third and intermediate gold tract is laid down.



Natal, and doubtless the tract, which seems to have been neglected for so many centuries, will be soon the scene of active operations of the miner.\*

As Mr. Mauch has visited the colony of Natal, where he was warmly received by our countrymen, and has had the opportunity of regulating his astronomical instruments by comparison with those of the Observatory of Pieter Maritzburg, I anticipate that he will largely and accurately extend our acquaintance with that great backbone of South Africa. I would add that, as the Council of our Society did, by small advances of money, assist Gerhard Rohlfs in carrying out those researches in Northern Africa which have obtained for him one of our Gold Medals, so I venture to hope that they will approve my suggestion that Mr. Carl Mauch—who, unassisted by any Government, has been accomplishing such great results on the slenderest means (provided by partial subscriptions raised in Germany)—may receive at our hands such aid as will enable him to bring his labours to a successful termination.

This newly-discovered auriferous tract is, I may state, precisely in that position in which, as a geologist, I should have expected to find gold, *i. e.* in the elevated and ancient slaty quartzose rocks (probably Silurian), with granite and greenstone, which form the mountains, in s. lat. 21°, that constitute the watershed whence some streams, tributaries of the Zambesi, flow to the north, and others, tributaries of the Limpopo, to the south. From the well-known fact that some of the rivers of Africa—particularly the Niger and its affluents—contain gold-dust, we may reasonably expect that the other mountain-tracts from which they flow will eventually prove to be as auriferous as the upper region of the Limpopo in the south-east of Africa; and thus with the spread of enterprise the geological *nuclei* or back-bones of Africa may prove remunerative to searchers for the precious metal.

This discovery of gold leads us once more to consider a suggestion made to us two years ago by Mr. George Thompson, namely, that the Ophir of Solomon might, after all, have been situated in the country of the Limpopo. He supported his view

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\* Whilst I write I have received a pamphlet, entitled 'The Gold-Fields of South Africa, and the Way to reach them;' in which the author, Mr. Robert Babbs, invites his countrymen and speculators to reach these gold-fields by way of Natal. I am indebted also to Mr. John Robinson, editor of the 'Natal Mercury,' for information regarding the gold discovery, which has naturally excited great expectations in that colony. In a recent letter, he states that a pioneer party, under the guidance of Mr. Hartley, left Potchefstroom for the gold-fields on the 13th March.

by mentioning recent reports brought by some missionaries of the existence on that stream of ruins of an ancient city. The discovery of gold will, I hope, lead to the opening out to us of a large portion of the interior hitherto traversed only by an occasional elephant-hunter. I trust, indeed, that the day is not distant when some adventurous explorer will make the boating-voyage from the interior by the Limpopo River to its mouth, as suggested by my friend Mr. W. Webb, and thus escape the necessity of a land-journey which no traveller with oxen can hope to accomplish, on account of the bites of the dreadful Tsetse fly, which infests that region. By such a boat-journey we should become acquainted with the whole course of this grand stream and its embouchure in the Indian Ocean, which has remained unknown to the present time.

The Ophir of Scripture had from early times been supposed to lie somewhere on the south-east coast of Africa.\* It was this belief that led the Portuguese to send expeditions soon after the voyage of Vasco de Gama, and subsequently to colonise largely in these latitudes; the relics of churches built by the Jesuit fathers being, it is said, still to be traced. But, after all, the Portuguese were never successful in finding any great gold-field, owing probably to their chief settlements being upon the Zambesi and to their having omitted to extend their researches southwards in the interior.

The question as to the real site of the Ophir of Solomon has long been a subject of dispute. My lamented friend the late Mr. John Crawford, President of the Ethnological Society, has in his excellent work, 'The Descriptive Dictionary of the Indian Islands,' analysed with great perspicuity and much knowledge the various hypotheses which have been suggested, and has considered that Ophir cannot with any show of possibility be placed in any part of India where the great geographer Carl Ritter had supposed it to be. Quite agreeing with my eminent friend that all the commodities forming the exports from Ophir could not well have been the native products of one and the same place, and that Ophir may have been an emporium, we have yet to ascertain, by a proper survey, whether the site of such an important place of trade might not have been at or near the mouth of the great Limpopo River which flows from the above-

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\* See D'Anville's Disquisition on Ophir, 'Mem. de l'Acad. des Sciences,' t. xxx. p. 83.

mentioned gold mountains. Looking to the great objection to the hypothesis of Ophir being in India, inasmuch as the seamen of the days of Solomon could not have made such long voyages, the learned author of the article "Ophir," in Smith's 'Dictionary of the Bible,' naturally preferred Arabia as the country in which Ophir was situated, both from its proximity to the Holy Land and as being within the bounds of the earliest navigators. Although I at one time thought that Arabia might possibly have been the auriferous region in question, I abandoned that idea when I ascertained that the mineral structure of that peninsula was such as to render it most unlikely that at any time it could have yielded gold. The absence of rivers and seaports is also strongly against the Arabian hypothesis.

Knowing, as we now do, from the structure of the adjacent countries, that the traders from Tarshish, whether Tyrians or Jews, could find no gold on either shore of the Red Sea, they would naturally continue their coasting voyage along the east coast of Africa in their endeavour to find it. In doing so, we further know, both from the mineral structure of the region north of the equator and the fact that the Jub, Ozy, and other streams which traverse the Somauli country, flow from tracts of sandstone and volcanic rocks, and bring down no gold-dust, that the old navigators could meet with no success in those parallels. Neither is the country between Zanzibar and the Zambesi auriferous. It is only on reaching the latitude of  $21^{\circ}$  s. that auriferous rocks occur in the mountains of the interior, in a region from which, as before said, the waters flow to the Zambesi on the north, but chiefly to the Limpopo on the south.

I venture, therefore, to say, that of all the sites hitherto suggested, the region which feeds these streams was, according to our present knowledge, in all probability the source which supplied the ancient Ophir. I have before stated that this region, besides gold, is rich in ivory and ostrich feathers; and if Hebrew scholars see no objection to the supposition that the Biblical writers might not clearly distinguish between the feathers of the peacock and those of the ostrich, another difficulty in choosing this South African site of Ophir vanishes. I would also add that parts of this region are specially rich in ebony—so rich indeed that, according to Livingstone, great profit might be obtained by bringing home cargoes of those valuable trees from the River Rovuma. Now, may not these have been the famous almug-trees of which Solomon made



pillars for the House of the Lord and the King's House, as well as harps and psalteries for the singers?

Mr. Crawford has very successfully shown that "sandal-wood," as suggested by some writers, could not, from its diminutive size, have been the almug-tree; and knowing, as we now do, the comparatively great size of the ebony and its beauty and tenacity, I suggest that this is a good additional reason for the adoption of the site I have suggested. However this may be, I earnestly hope that ere long the Limpopo and its branches may be well examined, if only with a view of ascertaining the truth of the rumour that extensive ruins of ancient buildings lie near them.

ABYSSINIA.—At various periods since the foundation of this Society, our attention has been attracted to some part or other of this region, so diversified in physical features and so unlike other parts of the world in the character and condition of its inhabitants. At the opening of the present Session I congratulated you on having our interest in this remarkable country re-awakened by our able Secretary Mr. Clements Markham, who brought before us in a most telling manner the wonderful exploits of our precursors in bold adventure, the Portuguese, who carried out expeditions in that country during the fifteenth, sixteenth, and seventeenth centuries. I also reminded you that, a quarter of a century ago, when I presided over you, I put before you in a condensed form all the sources of information we then possessed with regard to the country; those comments being elicited by the then recent researches of our Associate Dr. Beke, which we rewarded with our highest honour, for having, more than any of the travellers who had visited Abyssinia in the preceding forty years, added to our geographical acquaintance with it. During and since that time there has, indeed, existed between our countrymen and the French, an honourable rivalry. Led on by the able and zealous brothers d'Abbadie, many of our opposite neighbours, including Combes and Tamissier, and many others, have distinguished themselves as Abyssinian explorers. One of our own Fellows, Mr. Mansfield Parkyns, has also been much distinguished by his labours in this wild field, and has led us to give entire credence to the narrative of the great traveller Bruce, which, when first told, was so much discredited. In my opening Address of the Session I also told you that Her Majesty's Government approved the suggestion which

I offered to them of employing a certain number of men of science as attendants upon the military expedition about to proceed; and you also know that, whilst the greater number of the gentlemen so employed accompanied the force from India, our Secretary Mr. Clements Markham went from England, as the Geographer of the Expedition.

Confined as the advance of the British army has been to the long and lofty mountain range which forms the eastern boundary of the Abyssinian plateau, geographers must still take much interest in that range in itself, seeing that it is the dominant and leading feature of the whole region, in being the "*divortia aquarum*" between the Nile and the Mediterranean on the one hand and the Red Sea and the Indian Ocean on the other.

Ever with the advanced guard, and stationed for some time at Senafé before the general forward movement took place, Mr. Markham has been enabled to make many good observations on latitudes and longitudes, the heights of the mountains and plateaus, and the character of the rocks. He has also given us, in two memoirs which have been read to the Society, striking descriptions of the meteorology and natural scenery, as well as of the changes of vegetation at each varying altitude, in these highly-diversified highlands. A third memoir has been received, and a fourth is promised when the description of the country up to Magdala shall have been completed, and in this he will describe his entrance into Magdala with the storming party, as I know by a letter he has written to me on his gallop homewards. Even on that eventful day the Geographer was at work, for he took two observations for latitude on the heights of Magdala.

I have no hesitation in saying that, when they are put together, these memoirs of Mr. Markham will form as creditable a portion of the 'Journal' of the Society as it has ever contained; and I therefore feel satisfied that I did well in strongly recommending him to the Secretary for India as one well qualified to be the Geographer of the Abyssinian Expedition.\*

During the progress of this great enterprise, the various depart-

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\* Whilst these sheets are passing through the press, our meeting of the 8th of June has taken place, and the Fellows have heard from Mr. Markham himself—happily returned from his honourable and successful mission—the interesting account of the line of march from Antalo southwards, and the Topography of Magdala.

ments of the public service and public institutions have been well supplied with the best and most recent geographical information of this country by the Topographical Department of the War Office, which has issued at intervals successive editions of the route-map and other maps of Abyssinia. The chief credit of this is due to the promptitude and intelligence of Colonel A. C. Cooke, under whose direct superintendence the maps, as well as the publication entitled 'Routes in Abyssinia,' and many engravings of scenery, have been compiled.

Sympathising as I do with an eloquent writer in a recent number of an able periodical\* in the astonishment he expresses at the apathy with which many of our countrymen regard this expedition, I ask with him, When has Europe marched a scientifically-organised army into an unknown intertropical region, and urged it forward as we have done, for hundreds of miles over chain after chain of Alps amid the grandest scenery? and all to punish a dark king, of whom we only know that he was an able but unscrupulous tyrant who insulted us by unjustly imprisoning our countrymen. This truly is a fine moral lesson which we have read to the world; and as, in addition, we reap good scientific data, the Abyssinian Expedition will be chronicled in the pages of history as more worthy of an admiring posterity than many a campaign in which greater political results have been obtained, after much bloodshed, but without the smallest addition to human knowledge. I may add the expression of my delight that the distinguished General who has accomplished these glorious results is a man of science, and is particularly well versed in Geography.

DEPENDENCE OF GEOGRAPHY ON GEOLOGY.—*The oldest Comparative Geography.*—Having now touched upon some of the chief advances made by Geographers during the past year, I may briefly direct your attention to those subterranean phenomena by which the present outlines of sea and land have been mainly determined, and ask you not to rest satisfied with merely exploring and describing distant and unknown countries, or in fixing latitudes and longitudes. I would incite you to increase the pleasure of your studies by endeavouring to trace, from ages long anterior to the creation of man, the various changes which the surface has undergone before the present contours of land and water were attained,

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\* 'Spectator,' April 18, 1868, p. 456.



and to ascertain by what natural agencies such outlines have been successively brought about. If it be said that this is entering into purely geological questions, my answer is, that, as a weather-beaten explorer of the rocks, it is my pleasing duty to revert to my old love, and to stimulate you to ponder on the grand series of prehistoric events by which the present relations of land and sea have been realised.

Possessing no distinct evidence to show us what were the earliest conditions of the planet, whilst (according to general belief) it was passing from a molten mass into a solid spheroid, and seeing that, at the beginning of the geological record, we are as much lost in obscurity as the astronomer who peers into the remotest nebulae, the geologist explains to us, after fair search and inquiry, what were for the most part the aqueous, if not the hydrographical, conditions at the time when the oldest strata were deposited. He has so worked out the order in which the stony tablets forming the crust of the earth lie upon each other, containing within them the records of the earliest as well as of all succeeding living things, that he has at last developed the history of former life, from that beginning when only the lowest invertebrate creatures lived in the sea, and were buried in the first-formed marine sediments, through an ascending order of creations, until the human period was attained.

Leaving these records of successive creations to the palaeontologist, the physical geographer may unite with the geologist in the endeavour to elucidate the changes of the surface, as due to each great perturbation which the crust of the earth has undergone. In short, the ups and downs of the geologist are the fundamental data on which our present geographical features mainly depend.

It has been ascertained that life was first breathed into the waters in the form of marine invertebrate creatures of the lowest class called Foraminifera. We have learned, indeed, that the mud and sediment of those earliest seas, in which only such animals (and probably seaweeds) lived, were subsequently transformed into those crystalline gneissic rocks which constitute the basement of the Laurentian system of North America and the fundamental gneiss of North Britain and Bohemia.

The succeeding period, as proved by fossil remains in the lower stages of the Silurian rocks, was one in which a variety of marine animals, *i.e.* of shell-fish, crustaceans, and mollusks, began to abound, though these invertebrates are wholly dissimilar in species from any known in the present era.

During all these long early periods we have scarcely any proofs of the existence of lands; and, though some terra firma must have existed to afford materials for the accumulations of the sea-beds, we have every reason to believe that there were then no lofty mountains. In other words, it is supposed that the seas then occupied enormously wide spaces, and also that a much more uniform temperature and climate prevailed in both hemispheres than at present, judging from the fact that the fossil remains found in these ancient strata have a common *facies*, though found in regions widely remote from each other.

For a very long time, then, we may infer that, in the absence of high lands, nothing approaching to the present physical outlines of the surface existed. As time rolled on, this ancient fauna was largely increased by the creation of many new marine animals; but during all the immensely long older Silurian era the seas were unoccupied by a single fish, or, in other words, by any animal having a vertebrate column or backbone. The first fishes suddenly appeared towards the close of the long Silurian epoch,\* and, judging from the structure of the deposits, this particular period was one of long-continued quiescence. And yet this earliest kind of vertebrate animal, whose bones assure us that it is the prototype of the human skeleton, is distinct from and unconnected with all the other marine animals which lived before and with it. Thus, these first fishes are as clear a manifestation of creative power as any of those other proofs which are offered to us, as we mount up through the overlying formations, and continue our inquiry until we reach the recent superficial deposits.

It was at about the period when fishes appeared that we have the first proofs of the existence of dry lands, in the remnants of some curious land-plants; and then, indeed, it is clear that the earth's outline was becoming more diversified. But still we are without evidence that any great rivers then flowed from mountains. In the mean time, however, various outbursts of igneous rocks, whether porphyries, greenstones, basalts, &c., had been penetrating the surface, and had therefore added much to the materials out of which all marine deposits might be formed; doubtless these operations considerably changed the outline, and thus began the first approaches towards the present features of the earth, and the diversified relations of land and water.

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\* See 'Siluria,' 4th Edition, p. 477.

In subsequent ages fresh accumulations were added to the crust of the globe, and, in tracing these upwards, the geologist has demonstrated that he meets successively with races of higher organisation ; so that, having passed through the successive additions of lizards and warm-blooded quadrupeds to all that pre-existed, he finds relics of the human race in the uppermost of all these accumulations, and lying above those of all other kinds of animals. During this incalculably long time the face of the globe underwent numberless changes, most of which were due either to contractions of the crust, or to the expansion of internal heat and gases, producing great folds, crumplings, downcasts, and breaks in the outer layers of the earth. In some regions the strata, raised from sea-bottoms into lands and hills, were by that action of internal heat folded over into a multitude of convolutions. Occasionally these folds were broken athwart, leaving the great solutions of their continuity which are called faults.

Now, whether by such convolutions, or by the more complex action of innumerable fractures, such deposits were affected, I maintain that they then had impressed upon them certain great outlines, which, much as they have been since modified by atmospheric and diurnal action, still constitute in many tracts the chief drainage lines of the several continents and islands which geographers have to examine. In estimating the various perturbations of terrestrial masses, whether by upheaval or depression, of which geology affords evidence from the earliest period up to historic days, my belief is, that to one or other of these movements we can in many cases trace the *origin* of those valleys, deep lakes, gorges, and river-courses, which it is the province of the geographer to describe.

In illustration of these views, I may say that there are many mountain tracts, such as the Central Highlands of Scotland, large parts of Scandinavia, and the Ural Mountains, in which there is clear evidence that rocks of very high antiquity occupied their relative positions, and had deep depressions across them, at the times when such main outlines were originally determined. I believe, that in many cases the watercourses which still flow in the valleys took their direction then, and have ever since continued to act ; necessarily deepening their beds in the highly inclined or mountainous parts, whilst encumbering the lower countries with their *débris* and silt.

Hence I infer that there are regions in which these old and pris-



tine depressions have remained to this day as the prominent features which determined, and still maintain,\* the main lines along which atmospheric action, snow, and ice, and water, would necessarily exert the greatest influence in eroding the rocks.

There are, however, many tracts, such as parts of England, wherein great masses of secondary and tertiary rocks have been successively accumulated, and have covered over the ancient rocks; and in such districts the aboriginal lines impressed upon the older rocks have been hidden. The Alps—particularly the Western Alps—afford illustrations of both these phenomena; for there we can see tracts where the old rocks exhibit the original features of elevation, fracture, depression, and convolution; whilst, in other parts, we note how such pristine features have been obscured by the subsequent accumulation of younger deposits. Again, we have in that chain the clearest proof that it underwent great upheavals by one of the very latest geological movements, at which time some of the youngest formations on its flanks were raised into the highest pinnacles of the chain, having often undergone such intense metamorphism that the latest of them have assumed the mineral aspect of the oldest rocks. Yet through all this chaotic assemblage the skilful geologist can often trace to one or other of the great movements which the masses have undergone the dominant causes which have led to the existing drainage of these mountains.

True it is that glaciers and melting snows have through long ages widened gorges and ravines, and have worn away large portions of the mountain sides, but they have not, in my opinion, really originated the great valleys in and along which the glaciers have advanced.

Looking at the surface of the globe in this aspect, the geologist is but the physical geographer of former periods, and he ascertains beyond all doubt that, when the tertiary periods were completed, and long anterior to the creation of man, the hills and valleys of all continents and islands had, to a very great extent, assumed their present outlines—such outlines having been mainly due to subterranean action, followed at intervals by powerful denudations.

Having laboured through many a year in the endeavour to establish certain well-known land, sea, and river marks, in geological

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\* This view has been ably sustained by the Duke of Argyll, as regards the Argyllshire highlands, in a masterly memoir, recently read before the Geological Society of London.

science, I have made these observations to incite all travellers never to neglect the observation of these ancient phenomena, upon which the basis of physical geography rests. By connecting them further with the various proofs of the eruption of those igneous rocks which form such a large portion of our subsoil, they will in all their excursions have an additional stimulus to look to the foundations of our science; and, if imbued with the love of nature, they may, like the illustrious Humboldt, combine such knowledge of the earth on which they tread with all the existing wonders of animal and vegetable life which characterize its various zones of altitude and climate.

LIVINGSTONE'S PROGRESS IN SOUTH AFRICA.—Glorious indeed have been the tidings which we have received since the last Anniversary, in relation to the great South African traveller. It was then my duty to recapitulate my reasons for the utter disbelief I entertained of the truth of the story of his death, so generally believed, and I added other indications to prove the falsehood of the Johanna men. I also dwelt with satisfaction and gratitude on the support which Her Majesty's Government had afforded to the Council and myself in sending out a boat expedition by the Zambesi and Shiré rivers to the Lake Nyassa, to ascertain the truth. Rejoiced indeed did I feel when that expedition returned precisely at the time calculated, bearing the joyful intelligence, that not only had Livingstone not been killed at or near to Lake Nyassa, but that, accompanied by his nine trusty negroes (six of them christianised lads from Nassick near Bombay), he had passed on for many days' march into the interior. My anticipations as to the falsehood of the Johanna men having been thus realised, I felt certain that, if his usually robust health continued, we should not be long without obtaining that intelligence from himself which has since come, and filled the country with gladness.

Few can realise the anxiety I felt until the gallant and skilful Mr. E. D. Young brought us the first happy news; for I well knew how many chances of failure hung in suspense over that expedition. The boat was constructed of thirty-eight pieces of elastic steel, which had to be put together and taken to pieces three times after it reached the mouth of the Zambesi; to be carried past the great rapids and falls of the Shiré for 40 miles on the backs of negroes; again broken up on returning, and again put together to

descend the Zambesi, where the party were to be picked up by a cruising ship of war at a time duly calculated! Pondering on all these chances, I was too well aware that, if through any accident—such as the loss or fracture of a single piece of the steel boat, the insubordination of the black crews which were to man the boats, the sickness of any one of the party—the expedition returned without results, that I should have incurred much blame, and the scheme would have been stigmatised as the Utopian Livingstone Search. Through the admirable conduct, however, of Mr. Young and his associates, the truth was ascertained; and from that moment I had not the smallest misgiving as to the future travels of my dear friend in the interior.

Not dwelling on what Livingstone has already accomplished, for his letters have recently been laid before you, we may now speculate on his future steps, and if we form a right estimation of the course he is now following out, we may not unreasonably calculate the period of his return home. At the date of his last letters,—2nd February, 1867,—the great traveller was at Bemba, lat.  $10^{\circ} 10' \text{S.}$ ; and at that time all the problems respecting the outflow or inflow of the great Lake Tanganyika, about 200 miles to the north of his position, had yet to be determined. He had, indeed, to ascertain whether that vast body of fresh water, about 300 miles in length, and the central part of which only was known to Burton and Speke, was fed by waters flowing into it at its southern end, or sent off a river or rivers to the south-west. Now, this point, I have no doubt, he will have completely ascertained; for as by the last accounts brought by the Arabs he was at Ujiji, which lies in the central part of the eastern shore of Tanganyika, in the middle of October, so we know that he had eight months to settle that important question.

If it should transpire that he found no outflow to the south-west (and we know that there is nothing of the sort to the east), then the great mass of fresh water must have an outlet either to the west at a more northern parallel, or there must be an opening in the mountains at its northern extremity, by which the waters of the Tanganyika flow into those of the Albert Nyanza of Baker. If the first of these hypotheses prove true, and, the Tanganyika being found shut in on the north, a great stream should be discovered flowing from it to the west or south-west, why then my dauntless friend may follow that course of water across an entirely unknown region of Africa, and emerge on the west coast either by the settlements on



the Congo\* or by the territory of the Portuguese, to which he penetrated in his first grand travels across South Africa. In this case a very long time, perhaps eighteen months, may elapse, during which we shall be held in anxious suspense.

On the other hand, if the view of Mr. Findlay be sustained,—that a water-communication exists between Tanganyika and Albert Nyanza,—we can much more readily estimate the probable period of his return. In this event, the great physical problem of the true watershed of South Africa and the ultimate southern water-basin of the Nile will have been determined; and in touching the south end of the Lake Albert Nyanza, Livingstone will have, in fact, reached the known waters of the Nile.

If such be the case, opinions are various as to the course he would next follow: some persons believing that he would push on northwards, and, traversing Equatorial Africa, would endeavour to reach Gondokoro, and so descend the Nile to its mouth. For my own part, I have already expressed the opinion that, having once determined the great geographical problem which he went out to solve, it is more probable that he would turn to the east coast and find his way to Zanzibar, by a route to the north of that traversed by Burton and Speke. Should such have been his decision, there is nothing unreasonable in the hope of seeing him home in the autumn. If, however, he should be led, through his unrivalled intrepidity and self-confidence, to navigate the huge long sheet of water the Albert Nyanza, and thence endeavour to reach Gondokoro and descend the Nile to its mouth, I give you the following estimate of Sir Samuel Baker, as prepared at my request:—

“If Livingstone,” says Sir Samuel, “were to reach the north end of the Lake Tanganyika by the end of November, he would have fine weather until the 15th February, and might reach the south end of the Albert Nyanza by the end of December; and, if all went well and canoes were obtained, he might reach Magungo or the

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\* According to the map of Duarte Lopez, published in 1591, in Pigafetta's ‘History of Congo,’ and copied by many of the atlas makers of the sixteenth and seventeenth centuries, the Congo River flowed out of a great lake in Central Africa, corresponding pretty well in position with Lake Tanganyika. Lopez gleaned his information during his residence on the Congo from 1578 to 1587. See Mr. R. H. Major's Paper on Pigafetta's map of Africa, in our ‘Proceedings,’ vol. xi. p. 246. My attention has been recently again called to this subject of the equatorial lakes, as represented in the old atlases, by the Rev. P. H. Waddell of Glasgow, who has described to me a map of this kind given in a miniature Italian atlas of the sixteenth century.

Nile junction in one month, or by the 1st of February. Now, if the Arabs should have established a *dépôt* since I left Magungo, they would receive him. The Arab traders quit their *dépôts* annually in March, to deliver their ivory, &c.; and if the traveller should arrive among them before the 15th March, they would take him on to Gondokoro. All the boats that descend the Nile leave Gondokoro for Khartum at latest on the 15th April, and if the Arabs receive Livingstone before that time, they will bring him to Khartum about the end of May. The post from Khartum reaches Alexandria in about twenty-five days, and therefore if the great traveller should have to keep this line and reach Gondokoro and Khartum, we should hear from himself by the end of June, if he is to appear this year *viâ* the Nile. In that case he might be in England in August. On the other hand, if, having taken this line, Livingstone misses the Arabs, he will have the greatest difficulty in reaching Gondokoro; and again, if he should not attain that part till after April, there will be no boats to bring him down the Nile to Khartum before April, 1869.

"It is impossible," Sir Samuel adds, "to foresee the difficulties that may occur between the north limit of Tanganyika and the nearest Arab station; but should all go smoothly (which is seldom the case in Africa), it is possible, but not probable, that he might reach Gondokoro in April, 1868. Since I left, three years ago, the Arabs may have extended their journeys far south, and if so, they will materially assist Livingstone and save him from the annoyance and delays that we suffered in Kamrasi's country."

In anticipation of news from Livingstone himself, I have thus put his case before the Society, according as he may follow one of the three routes I have indicated; and my hearers must see that much doubt must attach to the adoption of any decided conclusion as to the period of his return to England; for, even if he should attempt to return by the Nile, we see, from Sir Samuel Baker's explanations, how many fortunate contingencies must combine to enable him to reach England soon. But whether, after determining the true watershed of South Africa, he should emerge by Zanzibar or by the mouth of the Nile, or deflecting from either of those courses, for the reason above assigned, he should reach the Congo or the Portuguese settlements on the west, Livingstone will have so vastly added to his fame, that he must unquestionably be pronounced the greatest of all African explorers. In any case, I trust that, looking to his long and devoted services, and that he has

been acting as her Majesty's Consul and accredited as such to all the Chiefs of the Interior of Africa, the Government will think it due to so illustrious a traveller, so zealous a missionary, and so faithful a servant, to grant him an adequate pension for life, as well as some suitable honour of the Crown.

CONCLUSION.—Reverting, Gentlemen, in conclusion, to the expressions I used in commencing the Address, on the very prosperous condition of our Society, and returning you my heartiest thanks for the kind continuance of the support you have invariably afforded me in my endeavours to do my duty, I must repeat what I have said on former occasions, that you should have selected a younger man to fill the distinguished post which I have so long occupied.

Since, however, you are pleased to keep me in office during another year, I can honestly say that I am as warmly devoted to your cause as ever ; and that, notwithstanding my advancing years, I will still strive to be worthy of the confidence you continue to repose in your veteran leader.

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PROCEEDINGS  
OF  
THE ROYAL GEOGRAPHICAL SOCIETY.

[ISSUED OCTOBER 3RD, 1868.]

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SESSION 1867-8.

*Thirteenth Meeting, 8th June, 1868.*

SIR RODERICK I. MURCHISON, BART., K.C.B., PRESIDENT, in  
the Chair.

PRESENTATIONS.—*Robert Michell, Esq.; G. W. Nicol, Esq.; P. J. Rowlands, Esq.*

ELECTIONS.—*William A. Bell, Esq., B.A., M.B., Camb.; A. T. Bowser, Esq.; William Clark, Esq.; The Hon. George Stephen Gough; Thomas C. Graham, Esq.; Sir George Philip Lee, Bart.; His Excellency Lieut.-Gen. Sir Robert Napier, G.C.B., &c.; George F. Plumberg, Esq.; Charles J. Smith, Esq.; Capt. the Hon. William John Ward, R.N.; Michael Williams, Esq.*

ACCESSIONS TO THE LIBRARY FROM MAY 11TH TO JUNE 8TH, 1868:—  
'Physical, Historical, and Military Geography.' From the French of Lavallé, edited by Capt. Lendy. Donor, Mr. E. Stanford.  
'Peruvian Reports on Rivers Ucayali, Pachitea,' &c. Presented by Don M. Paz Soldan. Orme's 'History of Indostan.' Purchased.  
'Political Missions to Bootan.' Purchased. Lacaille's 'Connaissance de Madagascar, 1862.' Donor, Rev. J. Holding. 'Loss of the *Winterton* East Indiaman on the Coast of Madagascar, 1792.' Donor, Rev. J. Holding. 'Afrikanische Reisen,' von Gerhard Rohlfs. 1868. Presented by the author. Cuninghame's 'Buddhist Monument.' 1854. Purchased. Darwin's 'Volcanic Islands.' 1844. Purchased. Dr. A. Petermann's 'Deutsche Nordpol Expedition.' 1868. Donor, the author. G. Bocardo's 'Fisica del Globo.' Genova, 1868. Donor, the President. 'Port Said.' Letter by Comm. A. Cialdi. Donor, the author. A collection of pamphlets bound, 1791, &c. Donor,

R. Biggs, Esq. 'Lettere sulla Tunisia, sulle Province di Susa, e Montasir.' R. A. Wilson's 'History of the Conquest of Mexico.' 1859. Purchased. Faidherbe's 'Recherches anthropologiques sur les Tombeaux Megalithiques de Koknia.' 1868. Donor, the author. G. Marsh's 'Physical Geography.' 1864. Purchased. F. Millingen's 'La Turquie sous la Règne d'Abdul Aziz, 1862-1867.' Donor, the author. Street's 'Indian and Colonial Directory, 1867-8.' Donor, the author. J. Chapman's 'Travels in South Africa.' 1868. Purchased. A. Forster's 'South Australia, 1866.' Presented. L. Agassiz's 'Journey in Brazil.' 1868. Purchased.

ACCESSIONS TO THE MAP-ROOM SINCE THE LAST MEETING OF MAY 11TH, 1868.—A Map of the Arctic and Antarctic Regions, showing the Discoveries up to the present date, and the proposed German exploration from Bergen, in Norway, to Sabine Island, in North-eastern Greenland. Presented by Dr. A. Petermann. Diagram showing the change of temperature and atmospheric pressure in various parts of Switzerland during the years 1863-5 and 1867. Presented by Professor J. M. Zeigler. Four sheets of the Geological Map of Sweden, viz., Eriksberg, Nyköping, Tärna, Sämsholm, with four books of letter-press. A small Map of India in 1868. Presented by E. Weller, Esq. Map showing the Route of the Pundit in Tibet under the direction of Capt. T. G. Montgomerie. Presented by Dr. A. Petermann. A view of Magdala, from a sketch by Th. von Henglin. Presented by the War-Office, Pall Mall, through Sir E. Lugard. A Map to accompany Gerhard Rohlfs' 'Narrative of his Last Journey.' Presented by Dr. A. Petermann. A bark canoe from Tierra del Fuego, with paddles, fishing-gear, and baling-buckets. Presented by William Robinson, Esq., Governor of the Falkland Islands.

The following Papers were read :—

1. *On a Project for the Scientific Exploration of Central Australia.*  
By DR. G. NEUMAYER.

AFTER an historical introduction, giving an account of the progress of discovery and exploration in Australia, and showing what great influence the difference in the physical character of the north-west and south-east coasts exerted on the occupation of the continent by Europeans, the author proceeded to say that :—

Soon after the discovery of gold in the east and south-east, our knowledge of the interior of Australia became very much enlarged, it having become imperative to look for fresh pasture-ground. The farther inquiry was pushed towards the north and towards

the interior, the farther receded the once so much dreaded desert. Scientific inquiry had already anticipated the result of actual exploration; inasmuch as meteorological and geological facts, derived from observations in the colonies surrounding the interior, spoke very strongly against the desert doctrine, which at last, through the glorious achievements of Burke and Wills in the east, and of Stuart in the centre of the continent, was proved to be fallacious. What was once regarded to be the main character of the whole country was now demonstrated to belong only to belts and strips of land lying amidst tracts of fine country, with thousands of square miles well adapted for pastoral purposes.

Although since 1862 the eastern portion of the continent, near M'Kinlay's and Landsborough's tracks, has several times been crossed and recrossed, nothing has been added to our scientific knowledge of the country thus opened out; the question as to its capabilities having been but very slightly examined, and even of the fate of Dr. Leichhardt we remained as ignorant as ever. To the unprejudiced mind it was apparent that these shortcomings were mainly attributable to a want of system in the exploration of the interior, and of conjoint action on the part of the Colonies which at various times have entered on explorations of this nature. Had the same amount of money, daring, and energy been expended on an uniform system of exploration, there could be little doubt that our knowledge would have been considerably more accurate than it is at present.

A glance at the map shows us that an immense tract of land is entirely unknown. Indeed, we might describe a circle in the portion lying to the west of Stuart's track, enclosing an area of half a million of square miles, of which our knowledge is absolutely *nil*. We should form a more adequate estimate of this fact, if we considered that this is at the same time the greatest absolute blank on the face of the globe,—the polar regions excepted; as we know more even of that great tract of country on the African continent which lies south of the equator and near the western coast. This "*Terra Australiensis incognita*" is somewhat less than one-fifth of the entire continent, and forms the western slope of what we are justified—according to all appearances—in terming the Great Interior Basin.

The northern limit of this basin has been approximately determined by the observations of Stuart, Gregory, Landsborough, M'Intyre, and Walker; and may be roughly indicated by a line running from  $18^{\circ}$  s. in the north-west to  $22^{\circ}$  s. in the north-east. In  $25^{\circ}$  s. and  $147^{\circ}$  E., we meet the watershed of the rivers flowing



to the interior and those flowing to the Indian Ocean,—Warrego, Darling, Murray. From Mr. F. Gregory's explorations in the west and north-west, it seems probable that the dividing range, which has never been crossed in that quarter, runs at a distance from the coast of from 200 to 300 miles and upwards. Now, if we determine the centre of the continent exactly (the point in which the whole mass of land, irrespective of elevation, may be regarded as concentrated), we find its position to be in  $26^{\circ}$  s. latitude, and  $134^{\circ}$  E. longitude; and if we farther describe round this point an ellipse, of which half the minor axis is equal to the approximate distance of the centre from the watershed on Stuart's track (510 miles) on the meridian, and half the major axis equal to the distance from the centre to the dividing range between the Barcoo and Warrego rivers (900 miles) on the parallel of latitude, we shall mark off approximately the limits of the interior basin. It is of considerable interest to note, as far as known, the elevations along this elliptical line. In the far west, at the extreme end of the longer axis, the sandstone table-land appears to attain an average elevation of from 2000 to 3000 feet, with peaks of trap-rock and granite rising to 4000 feet and more. Near the head of the Victoria of Gregory the dividing ranges appear to be 1300 feet high, and on M'Intyre's route 1500 feet, with occasional elevations of 1800 feet; their height above the surrounding country being not more than 200 or 300 feet. On Walker's track the watershed sinks to 1000 feet; whilst near the head of the Barcoo (Happy Valley) we know it to be 1658 feet. In the south-east, near Mount Murchison, it passes across ranges of 2000 feet elevation; whilst in the south-west, in latitude  $30^{\circ}$  s., it is from 1000 to 1400 feet; but then rapidly descends to the ocean, and, after disappearing in the great Australian bight, emerges again, and crosses the Eyria Peninsula, in parts 2000 feet high. In the latter instance our elliptical arc divides the waters draining to the ocean and those to Lake Gairdner; thus, even in this case, limiting the interior basin. The area of the country encircled by the above elevations amounts approximately to one million and a half square miles, and is, therefore, nearly the same as that of the coast river-drainage; the total area of the whole continent being something like three millions of square miles.

Through this immense expense of land M'Dougal Stuart forced his way from Adelaide to the shores of the Van Diemen's Gulf, nearly dividing it into two equal parts. Of the country to the west of his tract, containing our "*Terra Australiensis incognita*," nothing is known; although since 1860 great efforts have been made to increase our geographical knowledge of the eastern half. Notwith-

standing these efforts, even in this portion great areas are entirely unexplored—that between Stuart's and Burke's track to wit.

From the various expeditions made since Burke first crossed the continent, we gather that the watercourses in the interior flow partly towards the south, spreading over immense plains and causing during the rainy season great inundations in the country in  $26^{\circ}$  s., and between  $138^{\circ}$  and  $141^{\circ}$  E. To this fact we must to some extent look for an explanation of the origin of the so-called "Stony Desert" and the barren plains immediately to the north of it, which are shown on our map and formed at one time such a great impediment to the progress of explorers. Whatever of the drainage to the east of Burke's track is not of this character flows into the one great river-system of the eastern interior, the Barcoo (Victoria, Cooper's Creek), which, after a course of 1000 miles, empties itself into Lakes Eyre and Gregory, forming after its bifurcation a large river delta. It is not unreasonable to suppose that in the case of the watercourses in the unknown western parts of the continent a similar state of things must prevail. Probably some extensive drainage finds its outlet into lakes to the north of the Australian Bight, some 200 or 300 miles inland; for the author could not concur in the opinion—though expressed by so high an authority on Australian geography as the Rev. J. E. T. Woods—that Lake Gairdner would ultimately prove to be the main receptacle for the western interior drainage, inasmuch as this lake, if the observations be correct, is close upon 300 feet above the sea, whilst the elevation of Lake Eyre is only 70 feet. Indeed, it is difficult to conceive how, with such an elevation, any extensive reservoir could exist in that locality; and he felt inclined to believe that this large sheet of water, as it appears at present on our maps, would be greatly reduced in size, after a careful survey. It forms, in all probability, only the reservoir for the waters draining from the Gawler Ranges and others in the vicinity.

If the supposition respecting the situation of the main lake in the West should prove to be correct—and there are strong reasons in support of it—then it is equally certain that some long-extended system of watercourses stretches its branches as far towards the interior as longitude  $124^{\circ}$ , and near the tropic of Capricorn, of which we could not have obtained any knowledge by explorations along the coast. A shorter distance from the receptacle would involve an average fall of drainage far too large to be compatible with the nature of an interior system of drainage; and those explorations leave no doubt that "an intermediate river-system," like that of the Murray in the east, does not exist in the west; on the contrary,

from the explorations of Lefroy and others, it is made highly probable that numerous salt lakes of minor extent will be discovered in the whole of the country north of the Bight, which receive the drainage of the south-western portion of the interior basin.

Meteorological phenomena, in so far as they exert any influence with respect to the appearance of a country, such as that with which we have to deal, would, in the opinion of the author, act rather in favour of the country to the west of the continent. The principal feature in the difference of appearance between the sea-boards in the north-west and in the south-east, was the great distance to which the high mountain ranges in the north-west recede from the coast when compared with those in the south-east; but though it is obvious that such a difference would have operated, in the first instance, on the discoverer's mind, it is difficult to conceive how it could possibly create such a prejudice against the north-western coast as could not be dispelled by a closer examination. Explorations have to a great extent, indeed, dispelled the preconceived opinions respecting the coast between  $20^{\circ}$  and  $26^{\circ}$  s. latitude; and the fine rivers and harbours with which it is now known to abound place it beyond the reach of doubt that these parts also of Australia will participate in the great future which that fine continent is destined to enjoy. Now that it is known that an enterprising squatter succeeded in taking 2200 sheep from the Geraldine Mine on the Murchison, to Nickol Bay, by way of the Upper Gascoyne and the Alma, and that, too, without losing more than eight; and further, that the settlement at Nickol Bay ( $21^{\circ}$  s. and  $116^{\circ}$  E.) is progressing favourably; any doubts as to the practicability of the north-west coast can no longer be entertained: the less so as, in all probability, mineral resources known to exist near the mouths of the fine streams flowing from the high ranges, described by various explorers, will likewise be found higher up the valleys, and will add materially to the future wealth of the region. Colonisation efforts, however, have of late been mainly directed towards the country round the Gulfs of Carpentaria and Van Diemen, and it has been left to the colony of Western Australia to do the best it could in that quarter. It is not difficult to see that these colonies, separated as they are from their eastern sisters by a vast unknown territory, will have to struggle hard to make any progress: indeed, such progress is scarcely possible unless they extend their territory towards and across the watershed of the interior basin, and unless overland communication be established between them and the other colonies. The author had no doubt whatever that an exploration of that great blank on our map would materially assist, nay establish, such a communication, prac-



licable at all seasons, for the mutual benefit of the colonies, and give thereby a fresh impetus to the spirit of enterprise in the country.

Such an extension of the field of colonisation must have great importance for the interests of the mother country and the British possessions in India. It would tend to secure for the superfluous wealth of the Eastern colonies a new field whereon to expend itself, and from which India could be supplied with Australian products of every description, and that, too, in half the time in which this can now be effected, and across an ocean almost entirely devoid of danger or risk. It is moreover evident that, under certain emergencies with respect to the British dominions in India, emergencies which might arise at any moment, rapid communication and easy access to the dependencies in Australia would prove of the utmost importance, and cannot be estimated too highly. But the north-western coast cannot be successfully colonised without previously exploring that great western territory between Cambridge Gulf and the Australian Bight; and that this might be effected on the base of Stuart's track through the interior, the author hoped to be able to prove hereafter. If, on the one hand, the exploration of the interior be all-important for the complete success of colonisation in Australia, on the other hand it is also eminently calculated to promote the interests of science.

There was now offered an opportunity, such as is rarely to be met with, of furthering in the highest degree the interests of science, in comparison with which the sacrifices necessary on our part sank into utter insignificance. Surely the time had now arrived for us to emulate the bright example set us by that great explorer Flinders by exploring and opening up the interior in a scientific manner, as he explored and opened up the coast-line surrounding it. Scientific skill and research once brought to bear upon our knowledge of this vast interior, and in its very heart, would be sure to reverberate towards the exterior, in producing wealth and prosperity, and in giving a fresh impulse to the efforts of colonisation.

Twenty years ago, on the 3rd of April, 1848, the last news was received in Sydney of Dr. Leichhardt, when on the eve of his departure for the interior on that great expedition from which he was never to return. The professed object of this undertaking was the examination of the interior along the route from Moreton Bay to Swan River, with the special *object of observing the gradual change in vegetable and animal life from one side of the continent to the other*. A glance at the map will show that such a route would pass through the centre of the elliptical-shaped interior basin, and would for this

reason, if properly carried out, prove of the highest importance in forming correct ideas respecting its physical geography. We all know, however, that Leichhardt did not make his appearance in the west, that he has never been heard of since the above date, and that all the expeditions in search of him have, up to the present time, failed signally in ascertaining his probable fate. Notwithstanding all the efforts that have been made, we have no further intelligence of him except that he had been at the Alice River, in  $24^{\circ}$  s. and  $145^{\circ}$  E.; but of his course from that point, at which he had but just entered the field of exploration, we are in total ignorance.

For reasons contained in part in the explanations just alluded to, and in part detailed at some length in the paper read before the Royal Society, and printed in their 'Proceedings,' the author proposed that such an expedition should proceed from Port Denison, near the Burdekin or the Bowen ( $20^{\circ}$  s. and  $148^{\circ}$  E.) to a point in  $24\frac{1}{2}^{\circ}$  s., on Stuart's track. Along that route it is proposed to establish six dépôts in succession, each to be retained only for so long as may be requisite for the examination of the neighbouring country, and for the formation and transport to the following. The distance to be travelled between these two points is 1080 miles, to which fifteen months will be devoted, allowing, even with a very moderate rate of travelling, a stay in each of the dépôts of nearly two months. At point B (on the author's map) the dépôt is to be fixed somewhere between the Hugh and Fincke rivers; and it is intended to send from this place a party to the nearest settlements in South Australia, partly for the purpose of securing all collections, observations, &c., made up to that time, and partly for the purpose of receiving a fresh supply of stores, and, if necessary, fresh horses and men for the expedition. By the time it will have arrived at that part of the interior, stations will have been pushed forward to the north of Mr. Jarvis's station at Mt. Margaret; but, in any case, such an arrangement will not meet with any great difficulties, so that the expedition will be enabled to make a fresh start from that point through the interior on the basis of Stuart's track. This is of the more importance, as an opportunity will be thereby afforded of receiving any information respecting discoveries which may have been made in the west during the absence of the expedition from the settled districts, and which may materially assist its further movements. In penetrating the entirely unknown country, it is proposed to keep upon the same latitude as far as point C in  $125\frac{2}{3}^{\circ}$  E., thence to proceed on this meridian to  $27^{\circ}$  s., and from there to strike out for point D on the banks of the Swan River in  $31\frac{1}{2}^{\circ}$  s. and  $116\frac{1}{2}^{\circ}$  E. The total distance on this line is 1569 miles, for which twenty-seven

months will be required; and eight depôts will have to be formed approximately in the positions indicated on the map.

So far as known, there is on this route the greatest likelihood of meeting with practicable country,—that is to say, of meeting with no very great difficulties in the progress arising from the character or configuration of the soil and the vegetation with which it may be covered, and that there is every probability of being able to obtain ample supplies of water, grass, game, &c. It is upon these points, indeed, that the author in great measure grounded his hopes of ultimate success, as it was intended, on the present expedition, to avail ourselves, to the greatest possible extent, of the natural resources of the country. These, by the proposed method of procedure, and particularly by the formation of temporary depôts, it was hoped to turn fully to account in a way which would be utterly impossible in passing hurriedly through such a vast extent of unknown country.

The principle of partial self-support once adopted must necessarily influence to a great extent the equipment of an expedition, especially with reference to its stock of provisions. These will mainly have to be selected with a view to supplement, in their nourishing effects, the natural products of the country. This is not the place to enter upon a discussion of the physiological side of this question; suffice it to say that sufficient experience was now collected to enable us to form an accurate estimate of what will be placed at our command in passing through the interior, and to make it most productive of benefit to the explorers.

The object of primary importance is certainly to preserve the party in health and strength, and protect it against the ravages of scurvy and similar diseases. But all the precaution of medical skill would prove ineffectual if measures be not adopted against depression of spirits and the want of mental elasticity. The monotonous character of Australian scenery and the absence of adventurous excitement in Australian travel are both eminently calculated to predispose mind and body to disease. Care should, therefore, be taken to anticipate these deleterious influences by some energetic agency keeping mind and body in continual exercise. As such an agency none was more beneficial, and at the same time more useful, than the employment and participation of every member of the expedition—according to individual capacity—in the execution of the scientific surveys and labours.

Such were the principles on which the expedition was to be organised; some of the leading points in its organisation were as follows:—



(1.) Geographical discovery and scientific survey are the main objects of the proposed expedition.

(2.) All branches of natural science are to be included in the general plan of organisation, so far as this is compatible with the main objects in view.

(3.) The party to consist of twenty-five men, inclusive of seven professional men: leader; assistant-leader; geologist, botanist, and medical officer; zoologist and medical assistant; artist and photographer, and assistant observer.

(4.) For means of transport it is proposed to take fifty horses and ten camels, which latter animals have been acclimatised in the colonies, and show a special fitness and adaptation for Australian exploring work.

(5.) The probable expense of the expedition, extending over a period of three years and a half, is calculated to amount to 21,535*l*.

(6.) All money transactions are to be committed to the hands of a committee of administration, consisting of five members, and residing in the colonies. The members of the expedition are to be considered as salaried officers.

(7.) The results of the expedition,—collections, diaries, maps, &c.,—are, on the completion of the expedition, to be placed in the hands of the committee, to be turned to account in the interests of science and of the various countries which have participated in the undertaking.

Although lines of demarcation had been drawn across the continent from shore to shore, defining the boundaries of the several colonies, it is manifest that such a division, if strictly adhered to in respect to schemes of exploration and scientific research—each of the colonies confining its efforts to its own vast territory, without regard to the remainder of the continent—would so impede the progress of geographical knowledge, that there would be but slender prospect of the speedy attainment of the much-desired information respecting the interior. Moreover, the greater part of the unknown western interior, as well as the northern seaboard, cannot be regarded as included in the boundaries of either of the colonies, so that the mother-country might not unreasonably be expected to take an active part in the exploration. And while, under the circumstances, the proposed method of providing the necessary funds appears to be the fairest possible, the share of the burden falling on each of the several communities is thus reduced to an amount insignificant when compared with the probable results of the undertaking.

The author therefore believed this to be a case in which this Society

might very properly exert its powerful influence to aid in bringing about that co-operation which alone can lead to great results, both with regard to the interests of science and to colonisation. The importance of the enterprise, from a purely scientific point of view, was beyond dispute; and he should deem it presumption on his part were he to attempt to bring this part of the subject more prominently before this Society. It was rather on the ground of the extension of our geographical knowledge, with the view of opening up new fields for the spread of civilisation, and successfully completing the colonisation of one of the finest countries on the face of the globe, that he solicited the support of the Royal Geographical Society on the present occasion.

The PRESIDENT explained to the Meeting that Dr. Neumayer was a gentleman distinguished as a physicist and magnetician, who, having been for some time in Australia, was well acquainted with the difficulties that he would have to encounter in such an expedition as he proposed. He (the President) need not remind the older members of the Society how ignorant we were, comparatively few years ago, of the geography of Australia, and what an epoch of discovery was commenced when Sturt and that very remarkable man, General Eyre, late Governor of Jamaica, made their explorations. No man in Australia had passed through greater difficulties, or had endured personal hardships with more hardihood and perseverance than his friend Ex-Governor Eyre. He traversed 1800 miles of country along the southern part of the continent; but, unfortunately, without discovering any of those fertile tracts which have since been met with in the interior of Australia. The region travelled over by him consisted of great arid districts, where he suffered fearfully for want of food and water; but he would remind the meeting that he had still the welfare of the inhabitants at heart, for Ex-Governor Eyre was known as the protector of the aborigines of Australia. To these early expeditions succeeded the explorations of Stuart, Burke, Wills, Landsborough, M'Kinlay, and others; and from what had been done by them and by Leichhardt and others, we had been led to believe that fertile country existed across the continent in the part intersected by the parallel of  $23^{\circ}$  of south latitude. It was upon this knowledge that Dr. Neumayer had founded his rational project of an expedition, by which he hoped to succeed in traversing for the first time that great continent from east to west. The results of such an exploration to naturalists and physicists, indeed, to all men of science, would be of the highest importance. As one of the most eminent naturalists in the world (Professor Owen) was present, he hoped that gentleman would inform them what he thought might probably be discovered in his department of science along this great line of march, and by such an expedition. He saw also Professor Tyndall in the room, who, he hoped, would also tell them what was to be expected in the domain of physical science from this exploration.

Prof. OWEN said he quite coincided with the author of the paper, in his observation as to the limited amount of our knowledge respecting the natural history and capabilities of Australia. There was no part of the earth of which we Englishmen, who had derived so much from that fifth continent, knew so little as to its organic productions. The little that we do know related to a comparatively small part of the southern and eastern coasts. Beyond that limited region the natural history of Australia might be considered a blank. Therefore, they might well imagine with what interest he entered on this well-devised and well-considered plan of Dr. Neumayer, to obtain for us more



knowledge of the peculiar and wonderful works of Nature in her organic realm, which the continent of Australia may still have in store for us. He had said, we know less of the natural history of this part of the world than any other. But he would mention some points of interest in what we did know of Australian zoology, as justifying our hopes of what we might gain from this exploration. In organic nature there was scarcely any general proposition that could be made which was not affected more or less by exceptions. And the most remarkable exceptions to all the general propositions that had been founded upon observations of animal and vegetable life in the rest of the world had been results of discoveries made in Australia. When Cook, Banks, and Solander landed on its coast, almost the first creature they saw moving along the plain they knew not whether to call a bird or a beast, for it moved after the fashion of a bird on a pair of largely developed hinder extremities. It was that most singular form of animal life which we now know as the kangaroo. Observations since that time have multiplied our knowledge of the forms of this group of animals, and now there are some thirty or forty recorded species and genera from Australia. Besides the strange outward form of the kangaroo, we know from dissection that these animals present singular and curious modifications, especially of the internal structure of organs concerned in a recondite part of physiology. Without going into particulars, he might just mention one fact. Here was an animal that, full-grown, can reach nine feet high, whilst its young on coming into the world was not more than one inch in length. It was furnished, moreover, with that marsupial economy for the protection of the young which, in relation to transport to distant pools, seems connected closely with the climate in which the animal lived. Of the marsupial type of animal form there were numerous examples in Australia, differing in forms and habits, such as the wombat, the marsupial wolf, climbing phalanger, and so forth. The duck-mole and its monotrematous spiny ally were now the sole known exceptions to the teated character of their class. When, therefore, we had a knowledge, so singular and unlooked for, of types of two distinct and strange orders of the class of mammalia from one limited part of Australia, what might we not expect, if our observations were extended over the vast interior, as proposed by Dr. Neumayer? As to the birds, Australia was equally wonderful in its productions. Mr. Gould, who spent three years in collecting and observing, from a comparatively limited tract, brought home not a single species that was identical with what we had in our part of the world; even many of the genera were quite distinct. The results of his labours were to be found in the nine folio volumes which he had the good fortune to be spared to publish, on the 'Birds of Australia.' If he obtained such a collection from the south-eastern corner of Australia, what might we not expect from more extended explorations? It was not only the accession to our knowledge of new species and genera of birds and beasts, but, like the immortal discoveries of Robert Brown in botany, these acquisitions led to a re-casting of the science. The habits of some of the birds were most peculiar and instructive. We know that the magpie and the jackdaw are attracted by glittering substances; that if a lady in the country leaves her dressing-room window open, her best brooch may be taken and hidden. It seems a most idiotic procedure of such feathered pilferer. Yet the explanation of that curious habit is given by Gould, in connection with cognate birds in Australia, where they are not disturbed by man. The *chlamydera* is allied to our own magpies, and at the courting season the male bird builds a beautiful bower or avenue, overarched by long twigs or grass-stems, the entry and exit of which are adorned by various showy objects, as if to attract a mate by the show of a handsome establishment; which show the lover makes by picking up every pretty shell, every gay-coloured parrot's feather, every glittering mineral—even a gold nugget, if it came in his way, would be added to the heap. But this bower-building and adorning was not essential to the work



of continuing the species, for the female built her nest in the neighbouring tree. And to this indispensable construction our magpies and jackdaws were limited; they could not make their bower. There was not a wild or waste left in well-peopled Europe where they would not be scared from such work of supererogation—where some wanderer would not be attracted by their hoard. But now and then a little bit of the ancestral instinct would come out, which we should never have comprehended if it had not been for the observations of Gould. Again, Australia was the only country where birds put their eggs out to nurse. The mound-birds built up a heap of leaves twelve or fourteen feet high, and deposited their eggs in this mound, and left them to be hatched by the heat of the decaying vegetation; thereby showing a curious analogy to the snakes in our own country. Again, a word as to another class of animals,—the reptilia. The great Lace-lizard—largest of living Saurians (*Hydrosaurus giganteus*)—has its habitat in Australia; and, in the newer tertiaries of Queensland, vertebræ of a nearly allied Valanian lizard, almost rivalling in size those strange gigantic iguanodons and megalosauri of our older strata, had been found associated with remains of most strange, and, in some instances, gigantic forms of extinct marsupial quadrupeds. Some links between *Diprotodon* and *Macropus*, *Nototherium* and *Phascogale*, *Thylacoleo* and *Thylacinus*, *Megalanops*, and *Hydrosaurus* might be hoped for in the vast central tracts from east to west, now proposed to be explored by competent observers, with adequate means of collecting and preserving specimens. But then came the question, how were we to succeed in such expectations as these. He would appeal to gentlemen who had contributed to the prosperity of the British empire by their successful and sometimes daring speculations. For want of proper organisation, and for want of proper support, most explorations in Australia hitherto had been comparative failures. To this cause the results of Leichhardt's adventure had been lost; and, worse than that, we had lost Leichhardt himself. A man of business embarking in a commercial speculation with insufficient capital to command success, meets more blame than sympathy if he loses his venture: yet such unwisdom has characterised many of the exploratory surveys of the *terra incognita* of our great colony. Not only is the inadequate investment lost, but also the information gained by the explorers, by loss of the explorers themselves. In the present exploration he hoped for the sympathy of those who had gone out to Australia and had returned to this country with riches and honours. Dr. Neumayer was a scientific man, who held a position in Australia analogous to that of the Astronomer Royal in this country, and his well-considered project deserved our utmost attention. What he asked for was a sum of 7,000*l.* a-year for three years and a half; and he could not believe that either the Government or the Legislature would refuse that sum for an object so important; nor could he doubt that the Australian colonies themselves would supplement the grant by 5000*l.* or 6000*l.* more. A landed proprietor feels it not less his duty than his interest to have a due "survey" made of his property. The State seems to be in like relation to her colonies; to know their capabilities, their natural sources of wealth, is the essential preliminary to the derivation by the mother country of the full advantage of lands discovered and acquired for her by successful navigators.

Professor TYNDALL said the only point on which he felt himself competent to speak was quite an outlying subject, namely that of solar and terrestrial radiation, for observations on which Dr. Neumayer was eminently competent. He had had the opportunity of becoming acquainted with Dr. Neumayer, and the impression which he had derived was that Dr. Neumayer was a man of perfect straightforwardness and truth, and that he was entirely competent to undertake the work that he proposed to carry out.

Dr. NEUMAYER said he could only express his sincere thanks with reference to the words which had fallen from Professor Owen and Professor Tyndall.

Such words could only come from men who felt for science the same regard which he believed he had himself shown during his lifetime. It might, perhaps, appear strange that a foreigner should come forward to propose what he called a national British undertaking. But when they considered that he had been travelling along the coast of Australia at a time when the gold-fields had not been discovered, and when they further considered that he established on that continent the first observatory for physical observation, the results of which he had published in several volumes, he thought they would admit that he was entitled to consider himself an Australian colonist, and that he had not unsuccessfully aided, to the best of his ability, in the noble effort of British colonisation in Australia.

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2. *Geographical Results of the Abyssinian Expedition, No. 4.* By C. R. MARKHAM, Esq., Secretary R.G.S., Geographer to the Abyssinian Expedition.

In this Memoir, the fourth and concluding one of the series, Mr. Markham commenced by stating that the country between Antalo and Magdala is a mountainous region, entirely composed of volcanic rock, but divided into two very distinct parts by the river Taccaze. That to the north is an elevated ridge, crossed by several lofty ranges of mountains; whilst that to the south is a plateau of still greater height, cut by ravines of enormous depth. From Senafé to Antalo the rocks are almost all aqueous or metamorphic, with a few trachytic and basaltic boulders on the surface; but to the southward of Antalo there is a complete change, and this change is not confined to the geological features of the country. The scenery becomes grander, the vegetation more varied and more abundant, and the supply of water more plentiful. The peculiar feature of the country south of Antalo is that, while the backbone of the mountain-system runs north and south, with drainage to the east and west, it is crossed by ranges of great elevation, running across it in the direction of the drainage, and dividing it into sections. Of this nature are the Wodgerat and Ferrah ranges. From the Ferrah Amba there is a range of mountains running north and south, and forming a distinctly-marked watershed as far as Ashangi. The lower country to the eastward of this alpine region, from Antalo to the Taccaze, is occupied by lawless tribes of Mohammedan Gallas, who make incessant raids on the Christian inhabitants of the highlands, whose villages are seen usually perched on isolated hills surrounded by thick fences.

The mountainous country between Makhan and the basin of Lake Ashangi, about 14 miles across, is well wooded, the hill-sides being covered with junipers as tall as Scotch firs, flowering St. John's wort growing as trees, and a heath bearing white flowers, and

forming a bush sometimes 30 to 40 feet high. The drainage is still to the eastward, lofty peaks shutting out the view to the west. Looking from the highland the bright blue lake of Ashangi appears far below, bordered by a richly-cultivated plain and surrounded by mountains on every side. The lake is four miles long by about three broad, and is 8200 feet above the level of the sea. Mr. Markham found its latitude by meridian altitude of \* Dubhe to be  $12^{\circ} 35' 26''$  N. It furnishes one of the very rare examples of a fresh-water lake without any apparent outlet, the water probably escaping at some point on the eastern side by percolation; the surrounding mountains are all volcanic.

South of the Lat valley, the Dafat mountain-range crosses the line of the watershed, and about 16 miles further south is the still loftier parallel range of Abuya-meder, which forms the northern boundary of the valley of the Taccaze; the Dafat Pass was found to be 9820 feet above the sea-level. The country hereabout is well wooded, and a rippling stream flows down every valley; there is much cultivation in terraces up the mountain-sides. The streams flowing down the deep ravines to the south unite, and form the Taccaze. The most distant source was some 10 miles away due east from the line of march, in Angot. The Taccaze flows from east to west in a deep valley; the bed of the river being 7795 feet, and the summit of the plateau on its southern bank 10,700 feet above the level of the sea.

From the Wondaj Pass, south of the Taccaze, the British army obtained their first view of the Wadela plateau, a mighty wall 2600 feet high, rising abruptly from the valley, and ending in a level summit at an elevation nearly equal to that of the Wondaj Pass itself. At this season (March) the river was but a small stream, easily crossed dryshod by jumping from stone to stone; but the extent of the river-bed showed what it was during the rainy season, even at this short distance from its source. With the exception of clumps of kosso and other trees round the churches, Wadela is without either trees or shrubs, the hills being covered with grass and small wild herbs, the most common of which is a bright yellow composite shrub. The scenery is wild and desolate, not unlike that of the interior of the Orkney Islands. The people weave woollen and cotton cloths, the wool being raised on the plateau. The English troops, after crossing the Taccaze and reaching the plateau, instead of marching direct on Magdala by Kosso Amba, turned off in a south-west direction in order to reach the great road made by King Theodore across the Jita ravine, from the Wadela to the Talanta plateau. A large part of the length of Wadela was thus traversed, the



ground sloping gradually from 10,400 feet to 9100 feet, which is the height of the precipices above the Jita. The ravine is cut down to a depth of 3500 feet, through columnar basalt, the detritus in the slow course of ages having been carried down to fertilise the Delta of the Nile. Had it not been for King Theodore's marvellous road, this ravine would have been the most formidable obstacle on the whole line of march.

The Talanta plateau is a mass of columnar basalt, between the rivers Jita and Beshilo; it is a flat plain, quite treeless except the clumps round a few churches. The flora at this high elevation resembles that of north temperate climates; dog-roses, nettle, yellow and purple compositæ, clover, and plantain. The ravine of the Beshilo is even deeper than that of the Jita, the bed of the river being only 5638 feet above the sea, and the river itself was up to the horses' girths, being far the largest volume of water that had been met with in any stream on the line of march. The length of the descent was 4 miles 4 furlongs, and the width of the river-bed 113 yards.

The Magdala system or knot of mountains rises up between two ravines, south of the Talanta plateau, the sides to the east and west being steep and nearly 3000 feet high. Magdala itself is a mass of columnar basalt, with scarped perpendicular sides and with a plateau on the top, about two miles long by half a mile across. It is 9050 feet above the level of the sea, and thus a few feet lower than the Talanta plateau. Besides Magdala, the group comprises the peak of Selassie and the plateau of Fala; the three heights being connected by saddles at lower elevations. Between Magdala and Selassie is the saddle of Salamgi, 6 furlongs in length, a flat plain on which the camp of King Theodore was pitched; with perpendicular cliffs on either side, whence the mountain-sides slope rapidly down to the Menchura and Kulkula ravines. The height of Selassie is 9200 feet above the sea, and is composed of trachyte of a light colour. It is connected with Fala by a saddle some 100 feet below the level of Salamgi, which is approached from it by a rocky zigzag path. But these three heights are not in a line; they form an angle of which Selassie is the apex, and Magdala and Fala the two legs. At the foot of Fala is the small plain of Arogi, 1 mile and 3 furlongs across, with a gradual slope of 440 feet, and 1140 feet below the Fala plateau.

The Magdala district is not properly speaking a mountainous region, but simply a portion of the great basaltic mass of which Talanta is a part, cut up and furrowed by the action of water during many ages. The climate of the region between Antalo and Magdala

was, in March and April, healthy and agreeable, the hot sun being tempered by cool winds during the day, and the nights being cold. From March 12th to 24th there was not a drop of rain, but in the evening of the latter day a heavy thunderstorm broke over the camp at Dildi, with rain lasting from 6 to 9 P.M. Other showers occurred afterwards. The Wadela plateau was excessively cold, with ice forming in the night, and the grass covered with hoar-frost in the mornings. The minimum registered was 17° Fahr. The Talanta plateau was much warmer, owing probably to the deep warm ravines of the Jita and Beshilo, which flank it on either side.

Mr. Markham, in conclusion, summed up the geographical results of the expedition, and mentioned the work done in other departments of science, particularly in geology by Mr. Blanford, and in meteorology by Dr. Cooke. The officers of the Indian Trigonometrical Survey had also completed the mapping of the eastern portion of the Abyssinian highlands.

The Memoir, together with the three preceding ones, will be printed entire in the 'Journal,' vol. xxxviii.

The PRESIDENT, in returning the thanks of the meeting to Mr. Markham for his vivid description of the country over which the British army had marched, said that the present was the fourth paper which he had sent home during the campaign. We could not have found any man more capable of observing the geographical features, and of describing well what he had seen. He had already told them that Mr. Markham lost no opportunity of attending to his main object. Even in the day of that great excitement when Magdala was taken, he himself, being one of the first party to enter the hill fortress and to see the dead body of Theodore, succeeded in making two observations for latitude. Alluding to the touching episode Mr. Markham had given them respecting the last days of King Theodore, he added that it was the first clear account which had been given of the last days of a man who, although he was a barbarous king, had striven zealously and with considerable capacity to render Abyssinia an united country.

*Fourteenth Meeting, 22nd June, 1868.*

SIR RODERICK I. MURCHISON, BART., K.C.B., PRESIDENT,  
in the Chair.

PRESENTATION.—*T. Plowden, Esq.*

ELECTIONS.—*George Harvey, Esq.; William Rankin, Esq.; Gustaf Roos, Esq.; Rev. J. S. S. Robertson, M.A.*

ACCESSIONS TO THE LIBRARY FROM JUNE 11 TO JUNE 22, 1868.  
—'Marchand's Voyage, 1790-92.' 2 vols., 4to. Chenier's 'Morocco, 1788.' P. M'D. Collins' 'Voyage down the Amoor, 1860.' B. F. Bourne's 'Captive in Patagonia.' 1853. J. B. Fraser's

'Travels in Koordistan.' 1834. Donor, J. V. H. Irwin, Esq. 35 Volumes of Reports and other Documents relating to La Plata, Uruguay, Santa Fè, Buenos Aires, Confederacion Argentina, &c. Donor, T. J. Hutchinson, Esq. 'The Philippine Islands, Moluccas, Siam, Cambodia, Japan, and China, at the close of the 16th Century.' Hakluyt Society's Publications. 'The Alpine Journal; a Record of Mountain Adventure and Scientific Observation, by Members of the Alpine Club.' Donor, the Alpine Club. 'The Student's Manual of Ancient Geography,' by W. L. Bevan, edited by W. Smith. Murray, 1867. Donor, the publisher. Anderson's 'Narrative of an Embassy to China in 1792-94.' Donor, S. M. Drach, Esq. 'Exploration of the River Javari by Señor R. y Paz Soldan.' 1867.

The following Papers were read :—

- 1.—*Route from Erzerum to Diarbekr.* By JOHN G. TAYLOR, Esq.,  
H.M. Consul, Diarbekr.

AN abstract of this lengthy and important paper, communicated by the author to Mr. J. K. Lynch, F.R.G.S., was read to the meeting. Mr. Taylor stated that from Erzerum as far as Erzengan his route lay over an often-travelled country, and being well known did not require any further description; but from Erzengan he traversed a country, as far as Mazgerd and Kharpur, hitherto quite unknown to Europeans, even to that old Asiatic traveller Barbaro, though he must have been very near the line of road which he (Mr. Taylor) found so well repaid his trouble.

By reference to the map it would be seen that only two practicable routes are known from the north through the Deyrsim Mountains to the plain of Kharpur. They both concentrate at Mazgerd, and had already been described by Mr. Taylor in a paper transmitted to the Royal Geographical Society. The object of the present journey was to trace a third route through the mountains, also to Mazgerd, the debouching point, as shown in the paper above mentioned, of all communications between Kharpur and the north; and to search for ancient inscriptions, which—Mazgerd having occupied, as the author had pointed out, a prominent place in that period—he hoped would be found in its vicinity; both objects, he was glad to report, had been realised.

In his previous memoir he had given a full account of Mazgerd,—its old Pyre appertaining to the Parsee worship, and some facts relative to its ancient history,—a recapitulation of which would here be useless; but it was necessary to bear that description in mind, as adding much interest to the present route, which leaving Erzengan



follows the south side of the plain on which that town is situated, and enters the low mountains of the Koozichan district, in which the plain is lost. These mountains further on rise higher and higher, culminating in the snow-capped heights of the Deyrsim, which, as seen from this point, seem to bar all further progress, before reaching which the party came to a village called Pilameer, which was from Erzengan the first stage on the road.

The name Pilameer may easily be derived from, or be an abbreviation of, Pul El Ameer, the Ameer's Bridge. On his arrival he was very hospitably received by the Kizzelbash chief, Shah Hoosein Beg, whom he induced ultimately to conduct him through the new route.

From Pilameer Mr. Taylor was surprised to find a good road, though hilly in parts, leading through the Koozichan district as far as the Deyrsim range, through which, though popular error represented it as inaccessible, a remarkably easy route exists all the way to Mazgerd, never, he believed, since the days of the Seleucidæ, traversed by civilised beings, and which the jealousy of the Kurds has hitherto concealed from foreigners, for the obvious reason that the former do not wish it known that so easy a route exists through their formidable mountains. It passes through undulating valleys studded with thriving villages; and the country on either side is beautifully wooded with oak, pine, and poplar, and opens here and there into fine level, well-watered plains. Two considerable affluents of the Muzoor Su, that great tributary of the Murad Su, or Upper Euphrates, rise in these valleys, called by natives the Dor Boghaz Su and the Hidor Kighi, or Pirzi Su: the former joins the Muzoor Su near Pakh, and the latter at Pirzi. Neither of these great affluents appears on any map, and the course of the main stream of the Muzoor Su, as laid down by Kiepert, is altogether erroneous, as would be hereafter pointed out.

The ruins which exist in and about the villages are principally the remains of old churches, mediæval Armenian; some of them being not more than five or six hundred years old. These valleys are inhabited by a numerous population of Kurds, though a few members, sparsely scattered, of the Armenian nation still exist on mere sufferance, and, of course, are comparatively indigent. The Kurds appear well off, and the seclusion which they enjoy protects them from the impositions and taxes laid on their less fortunate brethren. Two hours before reaching Mazgerd a place is reached where volcanic action has thrown up a large mass of needle-pointed rock, which has at one time been scarped and formed into an impregnable castle. Where it could not be scarped, and round its weak points are traces of Pelasgic walls. No real building is to

be seen on the rock, which has been hollowed out, and chambers and galleries formed, which are ornamented with some taste by a waving scroll having been sculptured round the roofs and doorways. On the very top of this mass of rock are the remains of a room, or probably an old temple, from which an extensive view of the mountains and plains, about as far as Kharput, is obtained. Before each gate is a vaulted entrance or portico, furnished with seats, all of which are cut out of the rock. On the walls of one of these porticos, Mr. Taylor had the good fortune to find his anticipations crowned by the discovery of a cuneiform inscription\* of sixteen lines, which from the character he hoped would turn out Assyrian, and probably one of Tiglath Pileser's. The position of this inscription in the old gate is very interesting, as determining in some measure its great age, and as corroborating the author's opinion, communicated in a former memoir, that Mazgerd was the gate of the Deyrsim and commanded the easiest, shortest, and most practicable route through the mountains to the north and the Black Sea. He set to work and took a cast of the inscriptions which he transmitted by a Tartar messenger to Erzerum, to be thence sent to Sir Henry Rawlinson. Opposite this cuneiform inscription was an elaborately-formed cross, which shows that this castle occupied a prominent position in two widely distant periods of history. Mr. Taylor added that he had also made many observations, and collected materials for a new map, which, with the one previously forwarded, would, he hoped, give a good and true idea of this country.

The original Paper will be printed in *extenso* in the 'Journal,' vol. xxxviii.

The PRESIDENT said this was but a very brief abstract of one of the most elaborate and valuable communications on comparative geography that had ever been made to the Royal Geographical Society. By the courtesy of Lord Stanley, the original documents which were communicated to the Foreign Office, had been, upon the representation of their President, transferred to the possession of the Royal Geographical Society. Therefore, in the first place, they had to return their best thanks to Lord Stanley and the Foreign Office. He regretted the absence of Sir Henry Rawlinson, who was best able to do justice to Mr. Taylor's researches into the historical sites and antiquarian remains of Kurdistan. He saw present, however, one gentleman—Mr. Lynch—who knew a great deal of that region, and he should be glad to hear from him any observations he might wish to make.

Mr. LYNCH thought the paper was one of great interest, as it opened up a

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\* Note by Sir Henry Rawlinson:—"This inscription, although written in the Assyrian character, is in the old Armenian language, and belongs to Ruza, son of Arghisti, who was king of the mountains of Nairi. Arghisti was contemporary with Sargon and Sennacherib, Ruza with Esar Haddon and Asshur-bani-pal (Sardanapalus). It probably dates from about B.C. 660, and is the latest Armenian inscription yet found."

country of which we really knew scarcely anything. We had hitherto been entirely ignorant of this line of communication, re-discovered by Mr. Taylor, between the valley of the Euphrates, Babylon, Assyria, and, indeed, all those seats of the earliest civilisation, and Europe. He (Mr. Lynch) had himself travelled over that country from Constantinople by two routes into Southern Asia; one by Tabreez and Persia, and the other by Aleppo and Syria, the more southern route. He had also travelled by a third route, the direct one from Constantinople to Baghdad, over the Mehrab Dagh, the highest and most inaccessible of the Taurus ranges, which was a most difficult passage, particularly in the winter. An expedition under Colonel (now Sir Fenwick) Williams, sent out to determine the Persian and Turkish boundary, was shut up for months by the snow in this region, and it was supposed there was no possible way of getting into Southern Asia except over this Mehrab Dagh. The value of Mr. Taylor's paper consisted in this, that he had discovered a route the whole way from Erzerum to Kharput, so easy that a railway could be laid down along it. In addition to this Mr. Taylor had found very interesting inscriptions in the cuneiform character illustrating the history of that country in a remarkable degree. One discovery was a small gold vase, which was now in his (Mr. Lynch's) possession, and a lithographic drawing now lay on the table for the inspection of the meeting; it had been dug out of a mound near Nisibin, and had been pronounced by connoisseurs to be of the true Assyrian type.

LORD HOUGHTON said the paper related to countries of so much historical importance that he regretted it had not been delivered to us in further detail. He thought it was a curious illustration of the value of the Royal Geographical Society in awakening an interest in what he might call the by-paths of known countries. The great caravan-routes round this district were as well-known to ordinary geographers as the railroads of England. But there was this feature, that in the middle of Kurdistan there existed a perfectly easy mountain-road, unknown to the travellers who passed through the country. It was kept almost from the knowledge of the Government of the country itself, and yet it was full of beauty and interest. He thought we might be proud that the Geographical Society did help towards these discoveries, by exciting the attention and endeavours of travellers. We knew all the great aspects of the world, we knew all the great routes of the world, we knew by inference and analogy the nature and peculiarities of most districts of the world which had not yet been visited. It remained for this Society and other similar societies to do what was most important and most useful, namely, to complete the work of investigating these little interior spheres of unknown countries such as the present which had been visited by Mr. Taylor. He could only recommend that other travellers should undertake a similar work in other regions, and present their reports to this Society.

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## 2. *On the Geography and Recent Volcanic Eruption of the Sandwich Islands.* By Dr. THOMAS STALEY, D.D., Bishop of Honolulu.

BEFORE speaking of the late volcanic eruption in the island of Hawaii, the author said he believed that a few words might be useful on the geography of the group generally, of which Hawaii is the largest and the youngest member. He proceeded as follows:—

The Sandwich Islands, now constituting the kingdom of Hawaii, occupy a most central position in the Pacific. They lie in a diagonal



direction from S.E. to N.W., between  $18^{\circ} 50'$  and  $22^{\circ} 20'$  of N. lat. (so that they are only just within the northern limit of the Tropics), and between  $155^{\circ} 10'$  and  $160^{\circ} 40'$  of W. long. Their total area is upwards of 6000 square miles. Beginning with the most westerly, Niuhau, about 15 miles long and varying 1 to 3 in width, taking a north-easterly direction, we come to Kauai. These two have an area of 550 square miles. Crossing then a channel, which between the nearest points of land on either side is 80 miles in width, the next in order is Oahu, on which is the capital city of Honolulu, the chief port of the kingdom. Its area is 530 square miles. The others occur at less intervals, viz., Molokai, Lanai, Maui, with the islet of Kahoolawe. These four may be put down as having an estimated superficies of 800 square miles. About 4000 will be found to represent that of the largest island, viz., Hawaii. The harbour of Honolulu is formed by a coral reef acting as a natural break-water. A passage is marked out by buoys, and through it vessels drawing above 20 feet can now enter. When the American Pacific Steamship Company, in 1866, proposed to run a line of steamers monthly between San Francisco and Yokohama (Japan), they sent an agent to Honolulu, on whose representations the Government deepened the harbour, and extended their wharf seawards, so that these large vessels of between 2000 and 3000 tons might coal at its side. When all had been accomplished, the Company thought that the deflection from a great circle course, and then having to beat up in a higher latitude against the there prevalent west wind (a sort of return Trade), would cause loss of time; and they wished to cross in 18 days. In no instance, however, since the line commenced running has the voyage been accomplished in less than from 20 to 30 days. The fact is, they are finding the distance too great to carry the enormous quantity of coal necessary for the voyage: and so that, after all, by touching at the Hawaiian Islands they would make a quicker and more certain passage, and, from a larger space being available for freights, one more profitable. While speaking of the geographical position of Honolulu, and its effects on the commercial prosperity of the islands, I may state that within two years at the most, the railway between New York and San Francisco will be completed. The journey from Liverpool to Japan would then be distributed as follows:—

|               |    |    |    |    |    |          |
|---------------|----|----|----|----|----|----------|
| To New York   | .. | .. | .. | .. | .. | 12 days. |
| San Francisco | .. | .. | .. | .. | .. | 7 "      |
| Honolulu      | .. | .. | .. | .. | .. | 8½ "     |
| Yokohama      | .. | .. | .. | .. | .. | 13½ "    |

An addition to this of 8 days would extend the voyage to Hong Kong, the whole then being done under 50 days.

How far England had been wise as regards her interests in neglecting the often-suggested plan of carrying her trunk line of railway from Canada, through British Columbia, to the coast, it is not for me to decide. I will only say that when the distance between New York and San Francisco is accomplished in 7 days (instead of in 23, as now it is, over Panama) the present overland route to China by Suez would find it hard to compete, so far as passenger traffic goes, with the more rapid, healthier, and pleasanter route over the North American continent.

Happily for the social and moral improvement of the Hawaiians, the whaling trade has fallen off. In 1867 there were only 90 whalers, in the autumn, at Honolulu. The other vessels entering were; national or men-of-war, 9,—of which 5 were British, 2 American, 1 Russian, 1 French; merchantmen, 109,—of which 54 were American, 24 British, 29 Hawaiian, 2 under other flags. To supply the wants of these ships, no less than of the native and foreign inhabitants, imports are required. Those for 1867 amounted in value to nearly 2,000,000 dollars.

*Climate and Productions.*—Honolulu is under the isothermal line of  $77^{\circ}$  Fahr., the annual range of the thermometer being only  $12^{\circ}$ . At other places (according to aspect and elevation, of course) the temperature is very different. At Waimea Hawaii, in the month of July (on a table-land 4000 feet above the sea-level), I have been very glad to have a fire in the room where I slept. Here the average reading is  $64^{\circ}$ , with a maximum range of  $32^{\circ}$ . Perhaps nowhere, with the same extent of coast-line and surface, are the local climates so various. Though in the tropics, really there is no tropical wet season; the heaviest rains falling at the winter and not at the summer solstice, as they do in India, for example.

It is *then* the north-east trades—which prevail for 9 months of the year, depositing the vapours of the ocean on the northern and eastern slopes of the islands in gentle fertilizing showers—for a while cease, while southern winds take their place, bringing heavy rain and storms known by the name of konas. It is the eastern trade wind to which we refer when we speak of the windward or leeward side of the islands, and sailing to windward from one island to another. On the whole, the climate is most favourable to vegetation. The soil, volcanic in its origin, is generally fertile. The grass, now very prevalent, though not an indigenous one, is that called the *Menenia*, running along the surface, striking roots everywhere on its course into the ground, and forming a most nutritious

food for sheep and cattle. There are many cattle "ranches" (as they are there termed) and sheep-farms, in the hands of emigrants chiefly from New Zealand, Australia, British Columbia, and California.

The increase in the sugar cultivation during the last few years has been remarkable; plantations, with mills for grinding the sugar, and all the best and newest appliances sent from England and the United States, are to be found scattered everywhere throughout the kingdom.

The export last year was 17,127,187 dollars. It is now about 1000 tons per month. This important element in the industry and material prosperity of the islands, present and future, is in the hands mainly of American, German, and British settlers. The labourers are the natives, and about 1000 Chinese coolies, imported by the Government.\* Generally the planters prefer the former; but the Hawaiian population is too small, without calling in the aid of the latter, adequately to supply the labour market. In a cursory glance, such as this, at the physical conditions of these islands, in relation to the industry and pursuits of their inhabitants, perhaps this is the proper place to say a few words on their social condition and political status. The last census, taken in 1867, shows a decrease of the native population of 8300 (in *seven* years)—or of 11 per cent.)—and increase of 400 of white foreigners, or of 15 per cent., in the same period; the total population being 58,765 natives and 4194 foreigners. Into the causes of this fearful decimation of native people I will not here enter, further than record my own conviction that though at the period of their discovery by Cook, in 1778, the population was even then numerically on the wane, their diminution has been accelerated by their contact with the habits, and, I grieve to say, the licentiousness of many of our own race.

The whole Hawaiian Archipelago has been uplifted from the ocean by volcanic agency. Indications are not wanting that the same process is still silently and imperceptibly adding to the elevation of the coast-line throughout the group. The facts on which such a view is grounded are not in my possession, but they furnished, a few years ago, the subject of a very interesting paper in a local journal, contributed by an English gentleman resident at Honolulu, who has the reputation of being a thoughtful and able geologist. It would seem that the emergence of some portions of the

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\* Since this paper was read, 185 Japanese labourers have been imported by the Hawaiian Government, and many more are being asked for, while the authorities of Japan have intimated their wish for Hawaii to send thither all the crude sugars they can manufacture. The demand there is stated to be inexhaustible.



islands had been exceedingly rapid. In the island of Molokai well-defined coral is found at the height of 500 feet above the sea-level. A bed of coral or coral-sand exists on an elevation in Kauai 4000 feet above the sea-level. Kauai, with its islets, is far the oldest of the islands. Its volcanic mounds and craters have been rounded off, so to say, in the course of ages, into gently undulating hills. The scenery is soft and beautiful. It is a perfect garden in appearance, and most fertile. Still there are some craters and palis to be found in it of great antiquity. The valley of Hanapepe, at the head of which is a beautiful waterfall, has apparently been formed by volcanic action. The basaltic rocks and strata over which it falls have been much reversed and upturned, and present their columnar structure very distinctly to view, inclining to opposite directions at a vertical angle of about  $30^{\circ}$ .

Proceeding 80 miles eastwards, we come to the central group, which, though with no active volcanoes at work, are of a later origin.

No severe or destructive earthquakes are experienced in these islands, but only very slight vibrations. I except the submarine shocks, which, as in December, 1860, caused a rise in the harbour of Kahului eight or ten feet above its usual high-water level, spreading over the beach and destroying several houses. The chief extinct craters in these islands are in Oahu, Punch-bowl Hill, on which the fort at Honolulu is built—a comparatively small one—and Diamond Head, a few miles east of the same city. It is a promontory, on the top of which is a deep concavity. But it is at Maui we find the largest crater known, I believe, in the world. It is 10,000 feet high, between 20 to 30 miles in the linear measure of its rim, and more than 2000 feet deep. It forms the umbilicus, so to say, of East Maui, which is one vast mountain, culminating in this crater; the sides rich in verdure and all kinds of vegetation. It will be seen the island of which I speak consists of two well-defined portions, connected by a sandy alluvial neck or isthmus, the lowest part of which is only seven feet above the sea. The sand is constantly shifting, and as you pass in a vessel on the leeward side you may see clouds of it blown out to sea under the action of the trade-wind. The rock of the cliffs on the east of West Maui, which it terminates sharply, is basaltic. Anything grander or more awful than the view into that deep crater of Hale o ka la, as it is termed, cannot be imagined. It has, however, been so well and so often described, that I will not dwell on it now, but rather hasten to speak of that island which is the scene of modern volcanic action, where it has so recently been displayed with a frightful result to life and property. It would appear that the retreating of active volcanic

influence from north-west to south-east, which has been stated to apply to the whole of the group, does so equally to the Island of Hawaii itself. In the north of the island are the heights of Kohala and Mauna Kea (13,000), the last covered with perpetual snow, skirting the grassy and fertile plain of Waimea. Here are craters never active within the period of the traditions of the people. In fact, a line passing through Mauna Kea from west to east would nearly define the parts to the north and south of it, *now* respectively exempt from, and exposed to flows of lava, and even to destructive earthquakes. Running then parallel with the coast on the west is Hualalai, the last eruption of which was in 1800, A.D., when the stream of lava filled up a bay 20 miles long, and formed a headland running three or four miles into the ocean.

Mauna Loa, or, as it implies, *the great* Mountain, 13,500 feet above the level of the ocean, is to the south-east of Hualalai. On its eastern flank, about 30 miles from the coast, and on a plane 6000 feet above the sea, is the celebrated *pit crater* of Kilauea. Its outer rim is about *nine* miles in circumference. You descend some hundreds of feet down a zigzag path cut in the precipitous sides of the pit, till you come upon a black ledge. Passing banks of sulphur, and huge blocks of basaltic rocks confusedly heaped together, occasionally springing over crevasses of unknown depth, and walking over every form of solid lava, still warm to the feet, you come to the part which is always more or less active. When I saw it the diameter was quite 500 yards; but its area sensibly alters. The depth and immense size of the pit may be expected to keep the lava from overflowing the country, as hitherto, at least in the period of history, seems to have been the case. Between 1856 and 1859 there were subterranean flows, which, after some time, came to the surface 20 miles to the north-east. But usually this volcano (Kilauea) is not mischievous. It was in 1859 an eruption of Mauna Loa last took place, passing round the northern end of Hualalai, destroying a village in its course, and projecting the coast-line some distance seawards. The whole country for some miles round this mountain is, if I may so say, one great field of cinders.

I can speak from experience that the ride from Kealekekua Bay, through this lava country to the volcano of Kilauea, and thence to Hilo, during its greater portion at least, is the most trying and painful possible. But from the central table-land on which stand these huge volcanic masses, all round to the coast, the country is fertile, dotted with villages, cattle ranches, and sugar plantations. But over the southern slope now, alas! has swept the most frightful devastation.

On March the 27th, a visitor to the Kilauea observed that the fiery lake had overflowed its usual limits, filling that part of the pit crater with an immense covering of lava. On the same day a column of smoke was seen to rise to an immense height from the summit of the mountain. The next day began a series of earthquakes, not apparently destructive until the 2nd of April, when the most terrific shock of all took place. In the interval one of the English clergy, with his diary and watch at his side, took notes of the direction, violence, number, and time, of each oscillation; whether vertical or horizontal, whether prolonged or instantaneous. His observations are most interesting, and I trust may serve in some way the purposes of science. Upwards of 300 earthquakes were registered by him; some, however, occurring in the short intervals of sleep, and consequently unheeded.

It was the earthquake of the fifth day, April the 2nd, which was so disastrous. Its destructive force was felt most at Kapapala, south-east of the mountain. The land all round a cattle ranch situated here was subjected to a severe mud eruption, burying hundreds of cattle beneath it. A tidal wave the same day for 50 miles north of Alualu rushed inland, destroying several villages and many lives. Stone buildings were hurled down, sometimes burying people in the ruins; not only in the south, for houses were thrown down in Kona and Hilo. The settlement at Waiohino was utterly destroyed, thirty-three persons perishing through the earthquake or tidal wave.

On the 7th of April, ten days after the first symptoms of the convulsion, a new crater opened on the flank of Mauna Loa, whence a stream of lava flowed into the sea half-way between Apua and the southern point, the mud-flow meanwhile wending its course to the north of this direction. One of the fairest parts of the island was thus in a single day converted into a black-looking, desolate tract of cinders and mud. In many places in Kau the ground has opened, chasms of unknown depth have formed, whence sulphurous exhalations are emitted: a fissure, some miles in length, has extended inland from the coast, crossing one of the island high roads, and so deflecting it that what were contrary sides before are, at the point of breakage, now in one and the same straight line.

The floor of the crater in the Kilauea volcano has sunk some hundreds of feet. At Lahaiua, 120 miles from the starting point of the eruption, the column of cloud ascending from it was observed under an angle of  $3^{\circ} 30'$ , which (allowing for 500 feet of altitude, the position of the observer) indicated a height of nearly eight miles. So vast a body of vapour rushing visibly upwards with tremendous



rapidity, proved the presence of an immense heat at its base. The great rarefaction by heat of the air near the new crater would cause a powerful upward draught: then the cold air, charged with the vapours of the surrounding sea, would rush in to take their place. Rapidly ascending vast quantities of water would be precipitated in the form of cloud, and, when cooled, sink and be borne westwards by the trade-winds. This exactly happened; for, days after the eruption, the leeward islands were enveloped not only in a close oppressive atmosphere, but in clouds and heavy rains. A very distinct odour of sulphurous acid was perceptible at Honolulu, 200 miles distant, two days after the eruption.

The facts that I have grouped together connected with the recent catastrophe may serve possibly the purpose of those who investigate the laws, if there be such, which regulate volcanic agency.

I cannot conclude without mentioning the touching fact of the King going himself, heedless of danger, in a steamer chartered for the purpose, with food and clothes to distribute to his poor starving people, and to bring away the homeless and bereaved to a place of security.

The PRESIDENT was sure they must all feel proud that this most interesting communication had been prepared by a bishop of the Anglican church, who was a Fellow of their Society, and who had shown himself so well able, from the knowledge he had acquired, to treat not only of the statistical condition of the islands, but also of the remarkable phenomena connected with the volcanic eruptions. It did honour to the British Government to have placed a man like the Bishop of Honolulu in the position which he now occupied. For himself, he could scarcely realize whether he was presiding over the Geological Society or the Geographical Society, for the latter part of the paper was a truly Geological description of the volcanic phenomena and the physical features of these islands. He believed it might be necessary to request his lordship to give a repetition of the latter part of his paper at the Geological Society, where they would be bound to discuss what were the different ages of the elevations of which he spoke; whether the corals that had been highly elevated were the same as those that now lived in the sea, or whether they belonged to extinct species. These were interesting questions for the consideration of the geologist. He must say that, looking at what we knew of the Hawaiian Islands twenty years ago, and comparing it with what the Bishop had put before them, they would not fail to observe what a remarkable change had been effected in these years by British and American industry. He begged to express his special thanks to the Bishop of Honolulu in the name of the Society.

Lord HOUGHTON need not say how valuable it was to receive such records at first hand from our countrymen who went to distant parts, and yet kept up their interest in the old country. He knew, from family and local connections, how worthily the Bishop fulfilled the duties of his sacred office, and how he appreciated all the great interests of the country of his adoption, and yet kept a watchful eye upon any phenomena that might interest his countrymen at home. It showed that he had not broken off his connection with this country, and that though somewhat separated he was not totally disestablished. They thanked him very much for his communication, and begged to assure him that whatever might be our political relations, we should always be glad to preserve

those intellectual and friendly relations with the Sandwich Islands which now existed. He hoped public attention would be drawn to what the Bishop had said with regard to the route, which might be called the circumambient route of the world, that he had suggested. He had shown in how very short a time we might go across the continent of America, and by way of Hawaii to the most interesting parts of the East and back again to England. None of us could forget the interesting visit of the widow of the late sovereign of that country to England, and the affectionate and peculiar interest which her natural qualities and the dignity of manner which she possessed attracted towards herself in this country.

The BISHOP of HONOLULU said the last he heard of Queen Emma was, that she had been engaged in raising a fund for the relief of the distress which had been occasioned by the volcano. She had collected in different parts of the island by her own personal solicitation about 600%. She was most unremitting in doing good. Any sentiment of admiration for her dignity, piety, and benevolence which was entertained towards her in this country was amply justified by what she was doing in her own. He could only say he had felt it a great honour to be permitted to communicate matters which he felt to be a very trifling addition to our scientific knowledge. He felt it was a sacred duty everywhere to encourage the diffusion of useful knowledge, and especially of those sciences which enabled us to understand something of the world on which we lived. He felt a minister of religion was in his right position when he was doing all he could to advance the interests of science.

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3.—*On the Cape York Peninsula, Australia.* By Dr. A. RATTRAY,  
M.D., R.N.

THE triangular peninsula which forms the north-east corner of Australia is scantily peopled by small scattered tribes of aborigines. Their number has been variously estimated at from ten to fifteen thousand. They subsist on fish, turtle, roots, fruits, &c.; have no knowledge of agriculture; lead a lazy inactive life; never build huts, but sleep in the open air; have strong migratory propensities; and apparently a total disbelief in a Superior Being or God of any sort: characters which give them a claim to be regarded as among the lowest and most degraded of the human race; although, towards Cape York and the islands of Torres Strait, there is an evident Papuan admixture, and a correspondingly augmented intelligence.

Separated from the main mass of tropical Australia by the Gulf of Carpentaria, which so deeply indents the north coast, this peninsula, 300 miles wide at its base and over 400 miles long, stretches boldly north till within  $10\frac{1}{2}$  degrees of the Equator, washed on both sides by sea, and separated from New Guinea by Torres Strait, only 90 miles wide. Its east coast is skirted from 15 to 50 miles off by a steep submarine wall of coral, termed the Great Barrier-reef. This forms an admirable natural breakwater, and leaves a long passage, often calm as a lake, between it and the shore, along

which vessels may proceed to Torres Strait without passing through the reef; and moreover possesses numerous openings or gaps through which those who prefer the rival but rougher outer passage may sail, to make their desired exit into the safer seas beyond.

The rapidly-increasing importance of Australian commerce with India and China gives to Torres Strait and the not yet thoroughly appreciated inner and outer Barrier-reef routes, an interest that they would not otherwise possess. Their advantages and disadvantages are well pointed out in the Admiralty Sailing Directions, and the great question, still unsettled practically, appears to be, which is preferable for sailing ships and which for steamers. The easier course is unquestionably through the open coral-sea, and the navigation of the long tortuous river-like track inside the barrier the more intricate. It is this that causes so many merchantmen to prefer the former, in which the short cut through the reef is the only period of anxiety. But it is during this brief run of two or at most three days, whether through the Raine Island or Bligh's entrance, in which so many vessels are wrecked. Now, why run such risk when it might be avoided?

The triennial trips of H.M.S. *Salamander* up and down the inner route during the past three years whilst protecting Somerset, ought to prove the ease with which it may be traversed under sail or steam in its whole length, including its most intricate portion near Torres Strait, even in dark nights. Although its navigation has been materially benefited by the beacons placed by H.M.S. *Salamander* where most wanted, it might be still further improved. But even now, could merchant mariners, both under sail and steam, be prevailed on to make trial of what is little else than coasting throughout, they would soon prefer it. When rendered safer, and a better class of mail steamers is employed, the inner passage will doubtless become a favourite route to Asia and perhaps to England.

Nowhere will the traveller meet with finer views than in the lower part of the Cape York Peninsula, especially in the vicinity of Cape Tribulation. Here the mountain range which begins near Cape Howe and runs northward skirting the coast and forming the backbone of Eastern Australia, culminates in the curiously peaked "Peter Botte" at a height of 3311 feet, whose sloping sides, wooded from base to summit, deep well-timbered gorges and valleys luxuriant with vegetation, all indicate great fertility of soil. Thence onward, the hills of the now rapidly narrowing peninsula, which still skirt its eastern border from 5 to 30 miles inland, gradually decrease in height, become more irregular and broken as a range,



while the land shows less fertility and appears more barren and bare, till, near Cape York, they terminate in a series of undulating downs, of which the highest is not more than 300 feet above the sea-level.

The range which thus traverses the entire length of this peninsula consists, as it does further south, of an axis of crystalline rocks, chiefly of granite, porphyry, gneiss, felspar, and quartz, resting on the eastern and western flanks of which are thick strata of sandstone of the carboniferous age. As yet, however, no gold-bearing gullies or creeks have been found in the former system of rocks, like those of the richly auriferous regions of Victoria, New South Wales, and the Peak Downs, nor copper-mines like those of Burra-Burra, nor valuable and extensive coal-beds in the latter. No coal has been discovered further north than Port Denison. Lying between the volcanic rock and the super-imposed ironstone of the vicinity of Somerset and the adjacent Albany Island, we find a more local and limited deposit, consisting of a coarse quartzose sandstone, unfit for permanent building purposes. Iron is thus the only known mineral wealth of this peninsula.

Climate is another influence likely to affect the colonisation of the Cape York district. It is therefore important to ascertain its nature, and whether it is healthy or the reverse. Lying between the 10th and 17th parallels of south latitude it is entirely tropical. A line drawn obliquely across the peninsula from Cape Flattery to the bottom of the Gulf of Carpentaria forms a marked division inasmuch as all to the northward lies in the monsoon district, and all to the southward in the trade-wind region. In both, the year may be divided into the wet and dry seasons; and if we confine our attention to Somerset and the monsoon portion we find that the former corresponds with the north-west and the latter with the south-east monsoon. Variable winds and other atmospheric vicissitudes prevail as the one monsoon merges into the other; a period which the natives, who, according to Macgillivray, divide the year into three, term the *Malgui* or change; the others being *Aibu* or fine weather, and *Kuki* or wet weather. This region, in fact, forms the south-east corner of the great monsoon quadrilateral of the Indian Ocean, and the imperfect development of the north-west wind over this peninsula is doubtless due to its limited area, which forms a circumscribed heating surface, the influence of which is still further modified by proximity to the extensive sheets of water which bathe it on either side. If this peninsula did not exist there would be no north-west monsoon, and the south-east wind, which now prevails for nine or ten months, would blow all the year

through. On the other hand, the unusual length of the south-east breeze is due to the warming influence of the sub-equatorial surfaces of the huge islands of the Indian Archipelago and their shallow inter-insular seas, which strengthens what may in fact be regarded as an intensified south-east trade. The highly developed periodic winds of India and China are totally distinct from the less decided ones of Australia. The two, however, come in close contact at the Equator; but necessarily blow, as the corresponding trades do, in different directions and with dissimilar force. Thus, while those of India are s.w. and n.e., those of North Australia are s.e. and n.w., owing to the relative position which the land on either side bears to the central sea. Moreover, while the south-west monsoon of the northern hemisphere prevails during the same months as the south-east of the southern continent, the former is rainy and the latter dry: while, on the other hand, the opposite or north-east monsoon of India blows during the same part of the year as the north-west of Australia; but the former constitutes the dry and the latter the moist or rainy season. Thus in either hemisphere it is the breeze which blows from the Equator, *i. e.*, the warmest part of the Indian Ocean, to the north or south respectively, which is the rainy wind, and that which comes from landward the dry breeze.

Two peculiarities in the south-east trades and monsoons of north-east Australia are worthy of notice. Beyond a certain distance from the land they preserve their proper course; but those which impinge on the coast, on coming in contact with the mountain range which closely skirts it, take more or less the trend of the land, which however has a general south-east and north-west direction, and hence vary with every headland and bay. The still loftier chain, which traverses Papua in a line nearly perpendicular to this, has doubtless a similar influence on these south-east winds: and here we have a solution of the problem why this monsoon increases so much in strength as it nears Torres Strait. The convergent coasts of the Cape York Peninsula and New Guinea form a funnel which has this narrow channel as an outlet, through which the pent-up air rushes with great force, especially during July, August, and September, when the heating power of the sun on the high land and shallow-sea surfaces of the Indian Archipelago is apparently greatest. After passing through this strait, the breeze again spreads out and blows less strongly in the Arafura Sea, where its humidity, markedly augmented on the eastern side, also decreases.

The period of change of the monsoons of Torres Straits varies considerably in different years; and to ascertain the exact or pro-

bable time is not only a matter of great scientific interest, but of by no means light importance in a mercantile point of view, in connexion with the traffic between our Australian colonies, India, China, and England.

In the dry season the thermometer ranges from  $61^{\circ}$  to  $85^{\circ}$  (shade), and during the wet from  $75^{\circ}$  to  $90^{\circ}$  Fahr. The annual range is about  $28^{\circ}$ , and the average annual temperature  $78^{\circ}$  Fahr. The rainfall varies considerably in different years, both in the wet and dry seasons. In 1866 it amounted to 103 inches, during the previous twelve months to considerably more, and in 1867 very much less. Fogs and mists are only common in the wet monsoon, when thunder and lightning are also frequent, with squalls and heavy rains. The electric explosions, however, are seldom near the earth, but usually distant and dully heard high overhead in the dense masses of rain cloud, and unattended with such danger to life and property as in Queensland, where the altitude is often less, and deaths therefrom by no means rare.

It will thus appear that here, as elsewhere, various influences combine to form and modify the winds and climate of the Cape York Peninsula. Proximity to the sea is one of the greatest of these. The effect of shallow waters in tropical regions, not only in raising the temperature of the air, but in producing currents both in the aerial and aqueous oceans, does not appear to be sufficiently appreciated by physical geographers. Near a beach in the vicinity of Somerset, I found the temperature of the sea 200 yards from the shore, where the water was 54 feet deep, to be  $82\frac{1}{2}^{\circ}$  Fahr.; *i. e.*, half a degree above the air ( $82^{\circ}$  Fahr.); while 5 feet from the shore, where the depth was only half a foot, it was  $84\frac{1}{4}^{\circ}$  Fahr.; in other words,  $2\frac{1}{4}^{\circ}$  Fahr. higher. Now much of the Torres Strait region, which embraces an area of several hundreds of square miles, consists of coral-reefs and shoals, dry at ebb, and covered by only a few feet at high water, the heating of which by the sun overhead necessarily raises the temperature of the atmosphere, and creates an indraught of colder air; which, conjoined with other causes already explained, is the reason why the south-eastern monsoons increase in force as we approach this strait: and also why rainy south-west winds occur during the north-west monsoon. Originally, humid north-west winds, which, according to Maury, are merely the north-east trades of the northern hemisphere deflected, they reach the shallow highly heated Gulf of Capentaria, which renders them, if possible, still more humid, and here come under the influence of the indraught, caused by the still shallower waters eastward of Cape York, towards which they turn. The deflection



seriously influences the meteorology of the western portion of the Cape York Peninsula and adjacent part of the gulf, which get little of the moisture these north-west winds would bring, as also happens with the south-east trades and monsoons; and hence it is why much of this land is parched, cheerless, scantily vegetated, and characterized by a climate with irregular light winds, frequent calms, and alternate thunder-storms. In the shallow seas which lie between the north coast of Australia and Asia, and bathe the numerous islands of the Indian Archipelago, we have a still more extensive heating surface, which warms sooner and more highly, and preserves its temperature better than the far deeper Pacific and Indian Oceans on either side. And it is to this, conjointly with the caloric emanating from the land surfaces, that the position of the thermal equator, which runs through this region, is due. This is the only part of the globe where it lies to the southward of the physical equator; and nowhere does it take a greater bend than here, in curious contrast to the isotherm of Sydney, which is perhaps the straightest of all isotherms. Beyond Java the thermal equator again takes a very large north-ward curve as the influence of this district declines, and the effect of the extensive continent of Asia comes into full and unopposed play. It is to the less favourable circumstances in which Port Essington, situated in the same latitude, but 600 miles further west, is placed, which makes its average annual temperature  $5^{\circ}$  Fahr. higher than that of Somerset; viz., a greater land surface behind it, conjoined with the slighter cooling influence of its weaker south-east monsoon, and the higher heating effect of its stronger and more prolonged north-west winds. And, again, it is because still more advantageously situated close to the sea, to a cold coast current, and the lofty Andes, that Callao and Lima, which lie in about the same latitude of the opposite shore of the Pacific, enjoy a temperature  $5^{\circ}$  Fahr. under that of Somerset ( $73^{\circ}$  Fahr.).

The ocean-current tides and prevalent winds also greatly affect the climate of this region. Rossel's drift, which near Cape York, forms a one-knot current, warmed in a lengthy circuit of several thousand miles among the islands of the South Pacific, in a sub-tropical latitude, has necessarily become a warm stream long ere it reaches the vicinity of Torres Strait, especially during the north-west monsoon season, when the sun is in the southern hemisphere, and hence overhead, when the heat of its waters is usually only a few degrees either above or below that of the air. This doubtless tends slightly to raise the average annual temperature of Somerset, but acts still more in equalising and limiting it. The effect of the

strong three or four knot tidal currents which set through Torres Strait either way, on the climate, is not very apparent; but they probably have a cooling, or rather an equalising influence, and act by mixing the surface waters as they become heated with the cooler layers below, so as to reduce the temperature of the whole, and indirectly decrease that of the air overhead, heated principally by radiation. If no such tides and currents existed, we may conceive how warm these shallow waters would become, how hot the air over them, and how sultry the climate. Again, the influence of the south-east trades and monsoons in reducing the temperature is very marked. Coming cool and moisture-laden from the South Pacific they render the winter enjoyable, while without them the heat would be much more oppressive and unhealthy than it is. Move out of the breeze, and the atmosphere becomes hot and stifling in the full glare of the sun. Their temporary cessation, during the morning and evening calms, often illustrates this, and makes their value in tempering this season very apparent. On the other hand, the effect of the humid north-west winds is to render the weather sultry, debilitating, and sickly.

The physical features and geology, not only of this peninsula, but of Australia as a whole, necessarily influence the temperature, winds, and rainfall. From the extensive flat, arid, and almost rainless interior come the dry south-west winds prevalent in the Albert River district, and adjoining base of the peninsula as far north as the Mackenzie River. The deflection of the south-east winds by the mountains which traverse the peninsula, and of the north-west monsoon by the furnace-action of Torres Strait, accounts for the great difference in the climate to the east and west of the range, as well as for the character of the vegetation in its badly watered western and better supplied eastern slopes and adjacent country. While, again, it is the rapid decrease, both in height and area, of the peninsula that causes the slight rainfall of its northern part during the south-east monsoon, the fewness and unimportance of its streams, its parched soil, and its scanty and imperfectly tropical vegetation.

The characteristic aspects of the wet and dry seasons at Somerset are widely different; nor is this more marked in the inanimate world than in the animal and vegetable kingdoms. As in the tropics generally, there is here no real winter, and throughout the year perpetual summer seems to smile. Nothing can be more wonderful than the difference noticeable, even in a few days, after the advent of the north-west monsoon, with its profuse and invigorating rains; grasses, ferns, &c., soon shoot forth, and grow with amazing rapidity; buds

sprout and flowers bloom, till soon the whole country, profusely covered with vegetation, and clad in a gorgeous robe of bright green, variegated with gay flowers, assumes more the aspect of a tropical land, than during the more lengthy dry south-east monsoon, and yields a strong contrast to its late parched, cheerless character. In this change the animal kingdom participates. From every crevice in the perforated ironstone rock, every hole burrowed in the hard, stony soil, scorpions and lizards come forth, and snakes, *e. g.*, the carpet-snake, often 12 feet long, and the rarer common brown snake and death adder; while occasionally the huge gavial, 20 or 25 feet long, tempted from the not far distant muddy and mangrove-fringed bays which lie towards Cape York, shows its serrated back, as it floats lazily with the tide through the adjacent Albany Pass; or the ungainly sun-fish, as it swims along with the peculiar fan-like motion of its dorsal and ventral fins. The air is alive with the hum of the native bee, the chirp of the cricket, and the song or cries of pairing birds, among which the black cockatoo, the common yellow-crested white cockatoo, the parraquet, the rare and beautifully plumaged rifle-bird (*Ptilorus magnificus*), and a pretty migratory wood-kingfisher (*Tanysiptera sylvia*) are especially noticeable. Soon after the cessation of the rain, however, the flowers wither. The lacertæ and ophidiæ return to their subterranean haunts to hibernate; the few migratory birds which annually visit Cape York from New Guinea and the intervening islands are no longer seen; the ground becomes more and more parched; the streamlets occasionally met with in the gullies during the other monsoon now dry up; while the few streams in the neighbourhood dwindle down to a low ebb.

On the salubrity of Somerset will depend much its future as a field for successful settlement, and the number and class of emigrants likely to resort thither. Those of European extraction wisely prefer a healthy, and if possible a cool climate; and if that of this region is both sickly and sultry, it will probably influence the prospective population, by limiting the influx of the white races: and leading to the emigration of Chinese, Malays, South Sea Islanders, &c., in whom exposure to solar heat causes neither inconvenience nor risk to health, and by whom heavy out-door work may be done. Extra-tropical Australia is rightly regarded as one of the healthiest of our foreign possessions, and well adapted for the European constitution. But does this hold good with regard to the warmer Cape York district? The insalubrity of Port Essington first led to the belief that inter-tropical Australia was unhealthy as a whole; an idea which that of the Albert River district, at the



bottom of the Gulf of Capentaria, appears to confirm. There is little doubt, however, that in both instances this is exceptional, arises purely from local causes, especially proximity to marshy land, and does not extend to the whole of the north coast.

For at least eight or nine months of the year the climate of Somerset and entire eastern coast is fine for a tropical latitude. Moreover, no malarious or other local influences exist to render either of them unhealthy, and hence the climate at this season is remarkably genial for so low a latitude. The remaining three or four months of the rainy season are both less pleasant and healthy, and though the young and vigorous may withstand, perhaps for some years, the debilitating influence even of this trying period, various ailments are apt to occur, especially among the enfeebled. We find here no exception to the great law, that change from a cold to a warm zone is sooner or later inimical to health, and may prove productive of disease if not mortality in the white constitution, which attains its most perfect development, highest health, and longest life, only between the lines of the fortieth and forty-fifth degrees of north or south latitude. Occasionally the young and vigorous appear to flourish and even fatten for a time, but with the majority the reverse is the case. The climatic effect observable in the 240 sheep taken north from Brisbane, to supply Somerset on its first settlement, is interesting and tends to support this opinion. Under the withered herbage of the dry season, a scanty water-supply, and the hot atmosphere, they diminished in bulk to an average weight of 25 lbs. After the advent of the wet season, however, with its profuse succulent herbage, they soon gained in weight. But, half-starved thus for eight months, and overfed during the remainder of the year, a result otherwise than injurious to the breed, both as to carcass and wool, could not be expected. The wool of New Zealand, New South Wales, and other colonies of extratropical Australia, is decidedly superior to that of Northern Queensland; and it may be laid down as a law, that the warmer the climate the more degenerate the fleece.

From this review it will be obvious that the capabilities of the Cape York Peninsula, and its solitary township Somerset, are not of the most promising nature, and that we must not be too sanguine as to the future of either. But this may not, and probably does not hold good with regard to Tropical Australia as a whole; and the more extensive and better watered tract which lies to the west of the Gulf of Carpentaria, in which there appears to be both unlimited latitude for settlement and a more promising soil, may yet prove a valuable part of this southern continent, and be in some respects the India of Australia.

This paper will be printed entire, with map, in the 'Journal,' vol. xxxviii.

THE PRESIDENT said this paper was one of the many proofs we had had of the scientific abilities of our naval men employed upon the eastern coast of Australia. He would not allude to all that Captains Stanley, Blackwood, or Richards had done upon that coast. He regretted that Captain Richards, the hydrographer, was not present to state what he knew of the researches of Dr. Rattray, who, on board the *Salamander*, employed himself in investigating the physical geography, climate, natural history, and currents, in a way similar to that which Charles Darwin did when accompanying Admiral Fitzroy in his great explorations in the *Beagle*. The manner in which the paper had been put before them must have made all aware of the great qualifications of Dr. Rattray; especially the beautiful manner in which he had brought out the effect produced by the configuration of land and sea upon the nature of the climate. Before calling attention to another small paper which was to be read, he begged to inform the Society that the Council had determined upon applying to her Majesty's Government, through the Secretary of the Colonies, to contribute by their influence and recommendation to the exploration of Australia, from north-east to south-west, across the whole continent, as proposed by Dr. Neumayer at the last meeting. The expedition was to include several men of science, and was to be provided with a number of horses and camels; and to be, in short, the greatest and most important Australian expedition ever attempted. The expense would fall on the colonies, and, from the spirit which animated their governments, he was earnestly hopeful that they would readily acquiesce in the proposal. But it was desirable that scientific Societies like their own, and the Royal Society in particular, should lead the way in recommending this project. The Council of the Geographical Society had accordingly represented to her Majesty's Government the desirability of approving and recommending to the colonial governments the adoption of this great traverse. Dr. Neumayer intended to fall, in latitude  $23^{\circ}$ , into what he believed to be the principal watery region of Australia, where he can find subsistence; and he had so arranged his journey by stoppages at certain stations, that when he arrived at the central point which Macdougall Stuart reached, he would be able to obtain any supplies that might be required from Adelaide. It was hoped that he would come out at Swan River. This great project had been warmly approved by the Council of the Society.

THE PRESIDENT further added that there was one other subject to be noticed at this meeting: it was only mentioned to him that morning by Professor Tennant. There had been discovered in our own settlements on the Orange River, to the north of the Cape of Good Hope, some valuable diamonds. Two of them, which he had seen himself, were now in the possession of Messrs. Garrard. One of them Professor Tennant told him was worth 400*l.*, and another 200*l.* This was a new geographical fact as to the distribution of mineral matter, and he was glad that Professor Tennant had this opportunity of placing it on record in the 'Proceedings' of the Society.

#### 4.—On the Discovery of Diamonds at Hope Town in the Cape Colony.

By PROFESSOR J. TENNANT, F.R.G.S.

PROFESSOR Tennant said he had listened with great attention to the last address of the President of the Society, and had ventured to suggest an omission, viz. the finding of diamonds in a new locality—the Cape Colony. He considered the subject of such importance that it ought

to be brought before one of our scientific Societies. Two of these diamonds had been some months in London, and were at present in the possession of Messrs. Garrard, jewellers to her Majesty, in the Haymarket, but have been bought by Sir Philip Wodehouse. He saw the first on the 8th of August, 1867; it is in the shape of an octohedron, measuring in one direction three-quarters of an inch and in the other three-eighths, being therefore a compressed crystal; it presents a yellowish tinge of colour, and weighs  $21\frac{1}{3}$  carats. This was found at Hope Town on the Orange River, Cape of Good Hope.

The second is an octohedron, more symmetrical, and was found June 7th, 1867. It weighs  $8\frac{1}{3}$  carats; specific gravity, 3.54.

He had been as brief as he possibly could, simply with the view to place the fact on record. He had been told that six other diamonds had been found. These he had not seen; but on good authority he could believe that four of them were genuine. He was told that the first stone was treated in the usual careless manner. People stated that it was so hard as to resist the blow of a hammer: they took it to a blacksmith, who placed it on an anvil, and struck it with a hammer. He need scarcely say what was the result: the diamond was broken into a thousand pieces, and was, therefore, perfectly useless. It was a generally received opinion that the diamond, in consequence of its extreme hardness, would resist a blow of this kind. This was altogether a mistake. There was not a more brittle substance in nature than the diamond; although so hard as to scratch all other substances, it was, at the same time, so extremely brittle that he should be sorry to let a valuable diamond fall upon the floor. The symmetrical figure of the smaller specimen was well adapted for producing a diamond of the first brilliancy. It was composed actually of two crystals, and by cutting off a point it would produce one of the most brilliant diamonds, probably, that we had. It would be small in size, but in its present state it was worth 200*l*. The other, if placed upon a half-sovereign, would not project over its rim. It was a trifle over the weight of a half-sovereign, and the intrinsic value of it was a thousand times greater than the value of that coin.

The PRESIDENT, after congratulating the Fellows on the success of the past session, and hoping that the Society might be supplied in the ensuing session with equally important and interesting matter, adjourned the meetings to the month of November.

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## ADDITIONAL NOTICES.

(Printed by order of Council.)

1. *A Description of the Banda Islands.* By ALBERT S. BICKMORE, M.A.

ON the 5th January, 1865, I sailed from Boston for Batavia, with the hope of being able to reach the Moluccas, and re-collect the shells figured in Rumphius' 'Rariteit Kamer.' On the 1st of May I arrived at Batavia, where I was honoured, by his Excellency the Governor-General of the Netherlands India, with an order to all the officers in the Dutch possessions in the East to receive me kindly and aid me in every possible manner. Thence I proceeded along the north coast of Java to Macassar, the capital of Celebes, and thence southward through Sapi Strait between Sumbawa and Flores, and eastward to Kupang, at the southern end of Timur. From Kupang I passed northward along the western shore of Timur, and crossing the Banda Sea arrived at Amboina, the capital of the Spice Islands, or Moluccas.

Here, thanks to the privileges secured to me by the order of the Governor-General, and to the kind assistance offered me by every official, in three months I accomplished all, and even more than I had dared to plan, and was prepared to visit some other part of the Archipelago, and turn my attention to some other branch of natural history.

During all the time I had been gathering, arranging, and packing my collections, Mr. Arriens, the governor of those islands, had frequently honoured me with a visit. He now called again, this time to give me a pleasant surprise. He had a fine steam yacht of 300 or 400 tons. It was necessary that he should go to Banda, and he took it for granted that I would accompany him; and when we returned, the yacht would take me through a large part of the Archipelago north of Amboina,—a royal programme.

On the 7th of September we steamed down the magnificent bay of Amboina for Banda. Our company consisted of the Governor, who was on a tour of inspection, myself, and an "officer of justice" and lieutenant, with a detachment of soldiers, who had in custody a native of Java, that was sentenced to be hung as soon as we should reach our destined port.

The worst of the rainy season along the south coast of Ceram was now over, and the evening was cool, clear, and delightful. Early the next morning Banda, or more properly the Bandas, were in full view. They are ten in number; the largest, Lontar, or Great Banda, is a crescent-shaped island, about six miles long and a mile-and-a-half wide in its broadest parts. Its eastern horn curves towards the north, and the other points to the west. In a prolongation of the former lie Pulo Pisang, "Banana Island," and Pulo Kapal, "Ship Island." The first is only about two-thirds of a mile long and half as wide, and the last is merely a high rock, resembling the poop of a ship, hence its name. Within the circle of which these islands form an arc, lie three other islands. The highest and most remarkable is the Gunong Api,\* or "Burning Mountain," apparently attaining a very considerable elevation, because its sides rise so abruptly up from the sea. Between the Gunong Api

\* This Gunong Api must not be confounded with another similar volcano, of the same name, north of Wetta, and still another near the western end of Sumbawa, at the northern entrance of Sapi Strait.

and the northern end of Lontar lies Banda Neira, about two miles long and less than a mile broad. North-east of the latter is a small rock called Pulo Krakka, or "Women's Island." The centre of the circle of which Lontar is an arc, falls in Sun Strait, a narrow passage separating Gunong Api from Banda Neira. The diameter of this circle is about six miles. Without this another concentric circle may be drawn, which will pass through Pulo Ai (Wai), "Water Island," on the west, and Rosengain on the south-west; and outside of this a third concentric circle, which will pass through Pulo Swangi, "Sorcery," or "Spirit Island" on the north-west, Pulo Run (Rung), "Chamber Island," on the west, and the reef of Rosengain on the south-west. The total area of the whole group is only 17.6 geographical square miles.

The first European who reached these beautiful and long-sought islands was d'Abreu, a Portuguese; but he cannot properly be called their discoverer, for the Arabs and Chinese, and probably the Hindus, had been trading here for years before his arrival, and De Barros informs us that "d'Abreu (while on his way from Malacca) touched at Gresik, in the eastern part of Java, to procure Javanese and Malay pilots, who had made this voyage." Barros further adds: \* "every year there repair to Sutatam (Lontar) Javanese and Malays to load cloves, nutmegs, and mace, for this place being in the latitudes most easily navigated, and where ships are most safe, and as the cloves of the Moluccas are brought to it by vessels of the country, it is not necessary to go to the latter in search of them. In the *five* islands now named—Lontar, Rosengain, Ai, Run, and Neira—grow all the nutmegs consumed in every part of the world. A proof of the correctness of Barros' statements is seen in the names of the different islands mentioned above, for they are all of Malay or Javanese origin. The aboriginal population at that time is given at 15,000, which, if correct, would have made this group far more densely peopled than any other island or number of islands in the whole archipelago at the present day.

Our fast yacht rapidly brought us nearer over the quiet, glassy sea. This is Pulo Ai on our right. It is only from 300 to 400 feet high, and, as we see from the low cliffs on its shores, is mostly composed of coral rock. This is also said to be the case with the other islands outside of the first circle, and we notice that they are all comparatively low.

We now change our course to east, and steam up under the high, steep Gunong Api. On its N.W. side, about one-fourth of the distance from its summit down to the sea, there is a deep wide gulf, out of which rise thick, opaque clouds of white gas, that now, in the still clear air, are seen rolling grandly upward in one gigantic expanding column to the sky. On the top, also, thin clouds occasionally gather, and then slowly float away like cumuli, dissolving in the pure ether. These cloud masses are chiefly composed of steam and sulphurous acid gas, and, as they pour out, indicate what an active laboratory there is within the bowels of this volcano.

The western horn of crescent-shaped Lontar is before us. Its shore is composed of a series of nearly perpendicular crags, 200 or 300 feet high; but on the north side the luxurious vegetation of these tropical islands does not allow these rocks to remain naked, and from their horizontal crevices and upper edges hang down thick wide sheets of a bright green unfading verdure. The western entrance to the harbour, through which we are now passing, is between the abrupt magnificent coast of Lontar on the right, and the high, overhanging peak of Gunong Api on the left, and, as we advance, these separate and open to our view the steep lofty wall that forms Lontar's northern shore. This is completely covered with one dense matted mass of vegetation, out of which rise the erect columnar trunks of palms, from whose crests, as

\* *Vide* "Barros" in Crawford's complete and accurate work, 'Dictionary of the Indian Islands.'

from sheaves, long feathery leaves hang over, and slowly and gracefully oscillate to and fro in the slight air which we can just perceive fanning our faces. Now Banda Neira is in full view. It is composed of hills, which gradually descend to the shore of this little bay. On the top of one near us is Fort Belgica, in form a regular pentagon. At the corners are bastions surmounted by small circular towers, so that the whole exactly resembles an old feudal castle. Its walls are white and almost dazzling in the bright sunlight, and beneath is a broad neatly clipped glacis, forming a beautiful, green, descending lawn.

Below this defence is Fort Nassau, which was built by the Dutch when they first arrived in 1609, only two years before the foundations of Belgica were laid, and both fortifications have existed, much as they are now, for more than two centuries and a half. To the right and left of this fort extends the chief village, Neira, with rows of pretty shade-trees on the bund, or front street bordering the bay. Its population is about 2000, and that of the whole group between 6000 and 9000.

In the roads were a number of praus from Ceram; odd-shaped vessels, high at the stern and low at the bow, and, instead of a single mast, a tall tripod, which can be hoisted or lowered at pleasure. They were all poorly built, and it seemed a wonder that such awkward boats could live any time in a rough sea. A number of Bugis traders were also at anchor near by. They are mostly hermaphrodite schooners, carrying a square-sail or foresail, a fore-topsail, and a fore-royal, and evidently designed like the praus to sail only before the wind. They visit the eastern end of Ceram and the western and south-western parts of New Guinea, the Arru group, and all the thousand other islands between Banda, Timur, and Australia. When the mail steamer that took me to Amboina touched here, a merchant of this place, who joined us, brought on board four large living specimens of the *Paradisea apoda*, or Great Bird of Paradise, which he had purchased a short time before from one of these traders, and was taking with him to Europe.\* They were all very sprightly and in superb condition, and their colours had a bright, living hue, incomparably richer than the most magnificent specimens I have ever seen in any museum.

At our main truck a small flag slowly unfolds, and displays to those on shore a red ball. This indicates that the Governor is on board, and soon a boat comes off to take us to the village; but as business is not very pressing, as is usually the case here in the East, we prefer to conform to the established custom in these hot lands, and quietly enjoy a siesta instead of obliging our good friends on shore to come out in full dress and parade in the scorching sunshine.

Our first excursion was to the western end of the opposite island, Lontar, —the Malay name of the Palmyra palm, *Borassus flabelliformis*, whose leaves were used to write upon over all the archipelago before the introduction of paper by the Arabs or Chinese; and in some places even at the present time. Lontar, as already noticed, has the form of a crescent. Its inner side is a steep wall, bordered at the base with a narrow band of low land.

On its outer side, from the crest of the wall many radiating ridges descend to the sea, its south-western shore is a series of little points separated by small bays. The whole island is merely one continuous forest of nutmeg and canari-trees. The nutmeg-tree, *Myristica moschata*, belongs to the order *Myristicaceæ*. A foot above the ground the trunk is from 6 to 10 inches in diameter. It branches somewhat like the laurel, and its topmost sprays are frequently 50 feet high. It is diœcious, that is, the pistils and the stamens are borne on different trees, and of course some trees never bear fruit. The fruit, or *drupe*, before it is fully ripe, in size and form very closely resembles a

\* I afterwards learned that two of them were still living when he reached France.



peach that has not yet been tinged with red; but this exterior is only a thick fleshy rind (*epicarp*) which soon opens into two equal parts; and within is seen a spherical, black, polished nut, surrounded by a finely branching aril—the “mace”—of a bright vermilion. In this condition it is probably by far the most beautiful fruit in the whole vegetable kingdom. It is now picked by means of a small basket fastened to the end of a long bamboo. The outer part being removed, the mace is carefully taken off and dried on shallow bamboo baskets in the sun. During this drying process its bright colouring changes to a dull yellow. It is now ready to be packed in casks and sent to market.

The black, shining part seen between the ramifications of the vermilion mace is really a shell, and the nutmeg is within. As soon as the mace is removed, these black nuts are taken to a room and spread on shallow trays of open basket-work. A slow fire is then made beneath them, and here they remain for three months. By the end of this time, the nutmeg has shrunk so much that it will rattle in its black shell. The shells are now broken, and the nutmegs sorted and packed in large carefully-made casks of *jati*-wood, and a brand is placed on the head, giving the year the fruit was gathered and the name of the plantation or “park” where it grew.

From Neira a large cutter took us swiftly over the bay to Selam,—a small village containing the ruins of the old capital occupied by the Portuguese during the sixteenth and early part of the seventeenth centuries, while their rights remained undisputed by the Dutch. This western end of Lontar is about 400 feet high, and is composed of coral rock of very recent date. Walking eastward we next came to a conglomerate containing angular fragments of lava. This was succeeded on the shore of the bay by a fine-grained, compact lava, somewhat stratified, and this again by trachytic and basaltic lavas. Indeed nearly this whole island is composed of such eruptive rocks, and Lontar may be regarded as merely a part of one immense crater about 6 miles in diameter, if it were circular, though it may have been more nearly elliptical. Pulo Pisang and Pulo Kapal, already noticed as falling in this circle, are two other fragments of the old crater walls—all the rest have disappeared beneath the sea. Here then, is another, enormous crater, greater even than that seen among the Zeugger Mountains on the eastern end of Java, whose minor and major axes severally measure *three miles and a half* and *four miles and a half*, and whose floor of naked sand is well named by the Malays “the Sandy Sea.” Banda Neira represents the extinct craters rising in that Sandy Sea, and Gunong Api has a complete analogue in the still active Bromó. The enclosed bay, where vessels now anchor in 8 or 9 fathoms, is the bottom of this old crater, and, like that in the Zeugger Mountains, is composed of volcanic sand.

The radiating ridges on the outer side of Lontar represent the similar ridges on the sides of every volcano that is not building up its cone by frequent eruptions at its summit.

Lastly, the islands crossed by the second and third circles are so many cones on the flanks of this great volcano. True, those parts of some of them now above the sea are largely composed of coral rocks, like the west end of Lontar; but undoubtedly the polyps began to build their massive walls on the shores of islands of lava rock. They are doing this at the present moment. Every island in the group is now belted with a fringing reef, except at a few places where the shore is a perpendicular precipice, and the water of great depth. The western entrance through which we came to the roads is already quite closed up by a broad reef of living, growing coral.

A stroll through these beautiful groves, particularly at such a time, would be one of the richest pleasures a traveller could enjoy. All the nutmeg-trees were loaded down with fruit, which is chiefly gathered during this month, September, and again in June, though some is obtained from time to time throughout the year. It seemed surprising to me that the trees could be so loaded with fruit season after season; but the official reports show that, contrary

to what has been true of the clove, there has been but little variation in the annual yield of the nutmeg for the last thirty years.

An average crop for the last twenty years has been about 580,000 Amsterdam lbs. of nuts, and 137,000 lbs. of mace. The whole number of trees on Lontar, Neira, and Ai, the only three islands where they are cultivated, is in round numbers 450,000, of which only two-thirds bear fruit. As the Governor remarked to me while I was wondering at the abundance of fruit on every side, it is indeed strange that the income from all this produce does not equal the expenses of the Government in this residency. For this cause the Government proposes to give up the monopoly. Beneath these trees is spread a carpet of green grass, while high above them the gigantic canari-trees stretch out their gnarled arms and shield the valuable trees entrusted to their care from the strong winds which strive in vain to make them cast off their precious fruit before it is ripe. Such good service do the tall canaris render in this way that they are planted everywhere, and when the island is seen from a distance their tops quite hide the nutmeg-trees from view. The roots of this tree are remarkable. They spring off from the trunk above the ground in great vertical sheets, which are frequently 4 feet broad where they leave the tree. These wind back and forth for some distance before they disappear beneath the earth, so that the lower part of one of these old trees might well be fancied to be a huge bundle of enormous snakes struggling to free themselves from the Titanic hands that held them firmly for ever. As we leisurely passed along the crest of Lontar, with a thick foliage over our heads that effectually shut out the direct rays of the sun, we occasionally caught distant glimpses of the blue sea breaking into white, sparkling surf on the black rocks, far, far beneath us.

Soon we came to the "Look-out," known here, however, by the Malay name Drang datang, "the People Come;" for it is a peculiarity of that language, instead of naming a place like this *subjectively*, as we do, that is, from one's own action, to name it *objectively*, that is from the result of that action. This is placed on the edge of the interior wall, and is about 600 feet above the sea. From this point most of the Bandas can be distinctly seen in a single glance; and this view is undoubtedly one of the finest among all the isles of the sea. Before us was Banda Neira, with Neira, its pretty village, and left of this the dark, smoking volcano, and beyond both, on the right, Banana Island, where the lepers live in solitary banishment, and still further seaward Ship Rock, with the swell chafing its abrupt sides, while on our right in the distance were Pulo Ai and Pulo Run. All these rose out of the blue sea, which was only ruffled here and there by light breezes, or flecked by shadows of white fleecy clouds that slowly crossed the sky.

The next day we again went over to Lontar, and walked westward along the narrow band of low land between the base of the old crater-wall and the bay, visiting a number of the residences of the "Perkenniers," or "Park-keepers." Each of these consists of a rectangular area of about a quarter of an acre, enclosed by a high wall. The side next the sea is formed by the proprietor's house, and on the other three sides of the great open yard are rows of store-houses, and the houses of the natives who work on that plantation. Near the place at which we landed was a small area where all the mace is *white*, when the fruit is ripe, instead of red. From the west end of the island we followed most of the distance round its outer shore, and then crossed to our landing.

The Governor having finished his inspecting duties, now proposed that we try to reach the top of Gunong Api. There was only one man—a native—who had ever been to the top, and "knew the way;" though, to judge from a distance, one part of the mountain was just as dangerous as every other. He was engaged as our guide, and some ten others, whose duty it was to carry our lunch and a good supply of water in long bamboos. Early the next morning the coolies were ready. From the west end of the village we crossed the narrow "Strait of the Sun" to the foot of the mountain. Some coolies who had preceded us had cleared a



path up the steep declivity, but soon our only road was one of the many narrow tracks, where large masses of rocks and sand, which had loosened from some place high up the mountain, had shot down in a series of small land-slides, ploughing up the low shrubbery during its thundering descent. As long as we climbed among the shrubbery, although it was very difficult and tiring, it was not particularly dangerous until we came out on to the naked sides of the mountain; for this great elevation is not covered with vegetation more than two-thirds of the distance from its base to its summit. This lack of vegetation is caused by the frequent and wide land-slides, and by the great quantity of sulphur brought up to its top by sublimation, and washed down its sides by the heavy rains. Here we were obliged to crawl up on all fours among small, rough, black rocks of porous lava, and here all spread out until our party formed a horizontal line on the mountain side; so that when one man loosened the rocks, as every one was constantly doing, these might not come down and carry away some other man beneath him.

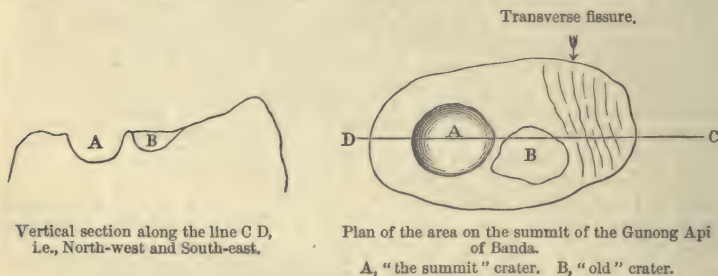
Our ascent now became slow and difficult; but we kept on, though sometimes the top of the mountain seemed as far off as the stars, until we were within about 300 feet of the summit. Here we came to a horizontal band of loose, angular fragments of lava from two to six inches in diameter. The mountain here rose at least at an angle of  $35^{\circ}$ , and to us, in either looking up or down, it seemed almost perpendicular. This band of stones was about 200 feet wide, and so loose that, when one was touched, frequently half-a-dozen would go rattling down the mountain. I had got about half-way across this dangerous place, when the stones on which my feet were placed *gave way*! This of course threw all my weight on my hands, when at once the rocks which I was holding with the clenched grasp of death also gave way, and I began to slide downward. The natives on either side of me now gave a loud shout, but not one dared to seize me, for fear that I should carry him down the mountain with me. Among these loose rocks a few ferns grew up and spread out their leaves to the sunlight. As I felt myself going down I chanced to roll toward my right side and notice one particularly, and quick as a flash of light the thought crossed my mind that my only hope was to seize that *fern*. This I did with my right hand, burying my elbow among the loose stones with the same motion; and that, thanks to a kind Providence, was sufficient to stop me, otherwise in less than a minute, probably in thirty or forty seconds, I should have been dashed to pieces on the rough rocks beneath me. The whole certainly occurred in a less space of time than it takes to read two lines on this page. I found myself safe, drew a long breath of relief, thanked God it was well with me, and, kicking away the loose stones with my heels, turned round, and kept on climbing. Above this band of loose stones the surface of the mountain was covered with a kind of crust formed chiefly of sulphur washed down by the rains. These rains had also formed many small grooves, and we made better progress here by crawling in these small gullies. At this moment the natives above us suddenly gave a loud cry, and I supposed of course that some one had lost his footing, and was going down to instant death. "Look out! Look out! Great rocks are coming!" and the next instant several small blocks and one great flake of lava two feet in diameter bounded by us with the speed of lightning. "Here is another!" It is coming straight for us, and it will take out one of our number to a certainty, I thought. I had stood up in the front of battle when shot and shell were flying and men were falling, but now to see the danger coming, and to feel that I was perfectly helpless, did, I must confess, make me quiver, and I crouched in the groove where I was climbing with the hope that it might bound over me; and that instant a fragment of lava about a foot square leaped up from the side of the mountain and flew directly over the head of a coolie a few feet on my right, clearing him by not more than five or six inches. I then supposed that the mountain was suffering another eruption, and that in a



moment we should all be shaken down its almost vertical sides; but soon the rocks ceased coming down and we continued our ascent, and in a few moments stood on the rim of the crater.

The mystery in regard to the source of the falling rocks was now solved. One of our number had reached the summit before the rest of us, and with the aid of a native had been tumbling off rocks, for the sport of seeing them bound down the mountain, having stupidly forgotten that we all had to wind part-way round the mountain before we could get up on the edge of the summit, and not being able to lean over far enough to see that we were just beneath him.

The whole mountain is merely one great cone of small angular blocks of trachytic lava and black volcanic sand. The crater at its top is merely a conical cavity in this mass. The form of the summit is nearly elliptical, and is approximately given in the accompanying plan and section.



The depth of the crater is about 80 feet. Its diameter we roughly estimated at from 100 to 150 yards. The area at the top is about 300 yards long, by 200 wide. This is composed of heaps of small lava-blocks, which are whitened on the exterior, and in many places quite encrusted with sulphur. Through these heaps of stones steam and sulphurous acid gas are continually rising, and we soon hurried round to the windward side to escape their suffocating fumes. In a number of these places we were glad to run, to prevent the shoes from being scorched on our feet by the hot rocks.

On the western side of the crater the rim is largely composed of sand, and in one place rises 120 feet higher than on the opposite eastern side. The top, therefore, partly opens out toward the east, and from some of the higher parts of Lontar one can see most of the area on the summit of this truncated cone. In this western part were many fissures, out of which rose sheets and jets of gas. When we had come to the highest point we looked over the north-west side down into the great crater, now active, one-fourth of the distance from the summit down to the sea. Dense volumes of steam and other gases were rolling up, and only now and then could we distinguish the edges of the deep, yawning abyss beneath us. Here we rested and lunched, enjoying meanwhile a magnificent view over the whole of the Banda group, when the suffocating gases were not blown into our faces. Again we continued round the northern side, and came down into an old crater, where we found a large rock with the word 'Etna,' the name of a Dutch warship, cut on one of its sides; and our Captain spent some time carving 'Telegraph,' the name of our yacht, beneath it. Great quantities of sulphur were seen here, more, the Governor said, than he had seen on any mountain in Java; for the great abundance of sulphur they yield is one of the chief characteristics of the volcanoes in this archipelago.

It was now time to descend. We called our guide, but he did not know where we ought to go, everything appeared so different when we looked down, from what it did when we looked upward. I chose a place where the vegetation was

nearest the top, and asked him if I could go down there, to which of course he answered Yes, as most people do when they do not know what to say, and must give some reply. I had brought up with me a long stick or kind of alpen-stock, curved at one end, and with this I reached down and broke places for my heels in the crust that covered the sand and small stones. For hundreds of feet beneath me the descent seemed perpendicular, but I slowly worked my way downward for more than a hundred feet, and had begun to congratulate myself on the good progress I was making—soon, I thought, I shall be down *there*, where I can lay hold of that bush and feel that the worst is past—when suddenly I was startled by a shout from my companions who were a short distance on my left. “Stop! Don’t go a step further, but climb up just as you went down.” I now looked round for the first time, and found to my surprise and alarm that I was on a tongue of land between two deep long holes or fissures, where great land-slides had recently occurred. I had kept my attention so fixed on the bush before me that I had never thought of looking to the right or left, generally a good rule in such perilous places.

To go on was simply impossible, so I turned round, climbed up again and passed round the head of one of these frightful holes. If at any time the crust had been weak and had broken beneath my heels, no earthly power could have saved me from instant death. As I broke place after place for my feet with the staff, I thought of Professor Tyndall’s dangerous ascent and descent of Monte Rosa.

At last I joined my companions, who had found the way we had come up; and, after some slips and sprains and considerable bruising, we all reached the bottom and were glad to be off the volcano, and reaching Banda Neira, feel ourselves on *terra firma* once more.

For a few days I could scarcely walk or use my arms; but that lameness soon passed away—not so with the impressions made on my mind by the perils I had so narrowly escaped, and even now, when suddenly aroused from sleep, for a moment the past becomes the present, and I am once more on the tongue of land with a deep gulf on either hand, or I am saving myself again by grasping *that fern*.

The first European who reached the summit, so far as I am aware, was Professor Reinwardt in 1821; the second was M. S. Müller in 1828, and from that time till the 13th of September, 1865, when we ascended it, only one party had attempted this difficult undertaking, and that party was from the steamer *Etna*, whose name we had found on a large rock in the old crater.

The height of this volcano we found to be 707·5 mètres, 2321 feet. Its spreading base occupies less space, 2 miles square. In size, therefore, it is insignificant compared to the gigantic mountains on Lombok, Java, and Sumatra; but when we consider the great amount of suffering, and the immense destruction of property that have been caused by its repeated eruptions, it becomes one of the most important volcanos in the archipelago.

From Valentyn and later writers we learn that eruptions have occurred in the following years :—1586, 1598, 1609, 1615, 1632, 1690, 1696, 1712, 1765, 1775, 1778, 1820, and 1824.

That of 1615 occurred in March, just as the Governor-General, Gerard Reyust, arrived from Java with a large fleet to complete the war of extermination that the Dutch had been waging with the aborigines for nearly twenty years. For some time previous to 1820, many people lived on the lower flanks of Gunong Api, and had succeeded in forming large groves, or, as the Dutch prefer to name them, “parks” of nutmeg-trees. On the 11th of June of that year, just before 12 o’clock, in an instant without the slightest warning, an eruption began which was so violent that all the people at once fled to the shore and crossed in boats to Banda Neira. Out of the summit rose perpendicularly up a great mass of ashes, sand, and stones, heated until they gave out light like living coals. The latter hailed down on every side, and as the

accounts say, "set fire to the woods and soon changed the whole mountain into one great cone of flame." This happened unfortunately during the western monsoon, and so great a quantity of sand and ashes were brought over to Banda Neira, that the branches of the nutmeg-trees were loaded down until they broke beneath its weight, and all the parks on the island were totally destroyed. Even the water became undrinkable from the light ashes that filled the air and settled in every crevice. This eruption continued incessantly for *thirteen* days, and did not wholly cease at the end of six weeks.

During this convulsion the mountain was apparently split through in a N.N.W. and S.S.E. direction. The large, active crater, which we saw beneath us on the north-west side of the mountain, from the spot where we lunched, was formed at that time, and another was reported higher up between the new crater and the older one on the top of the mountain. A stream of lava poured down the western side into a small bay and built up a tongue of land 180 feet long. This fluid rock heated the sea within a radius of more than half a mile, and nearer the shore eggs were cooked in it. This lava stream is the more remarkable, because it is a great characteristic of the volcanos throughout the archipelago, that, instead of pouring out fluid rock, they only eject hot stones, sand, and ashes, or mud—that is, water mingled with sand and ashes,—such materials as are thrown up in those volcanos where the eruptive force is known to have attained its maximum and to be becoming weaker and weaker.

On the 22nd of April, 1824, while Governor-General Van der Capellen was entering the roads an eruption commenced, just as had happened 209 years before, on the arrival of Governor-General Reynst. A great quantity of ashes again rose upward from its summit, accompanied by clouds of "black smoke," in which lightnings darted, while such a heavy thundering rolled forth that it completely drowned the salute from the forts on Neira, in celebration of the Governor's arrival. This was followed by a second eruption, succeeded by a rest of fourteen days, when the volcano again seemed to have regained its strength, and once more ashes and glowing stones were hurled into the air, and fell in showers on all sides.

But the people of Banda have suffered quite as much from earthquakes as from eruptions, though the latter are usually attended by slight shocks. Heavy earthquakes, without eruptions, have occurred in 1629, 1683, 1710, 1767, 1816, and 1852.

Almost the first objects that attract one's attention on landing at the village are the ruins of those houses that were destroyed by the last of these fearful phenomena. Many houses had their walls levelled to the ground, but others, that were built with especial care, suffered little injury. These walls are made of coral-rock or bricks. They are two or three feet thick, and covered with layers of plaster. At short distances along their outer side, sloping buttresses are placed against them, so that most of the houses in Banda look more like fortifications than private residences. The first warning that any one had of the coming destruction was that the water suddenly began to stream out of the enclosed bay, and this continued until the war brig *Haavi*, which was at anchor in 8 or 9 fathoms touched the *bottom*. Then came in a great wave from the ocean that rose at least to a height of 25 or 30 feet over the low western part of the village, which is separated from Gunong Api by the narrow Sun Strait. Praus lying near this shore were swept up against Fort Nassau, which was so completely engulfed, that it was stated to me that one of these native boats was carried over the walls of the fort, and remained inside when the sea had receded to its usual level. The part of the village over which the flood swept contained many small houses, and nearly every one of them was carried away.

This rapid outpouring of the water from this enclosed bay, or old crater, was probably caused either by the elevation of the bottom at that spot, or else



by a sinking of the floor of the sea outside, so that this water was drained off into some depression that had suddenly been found. We have no reason to suppose that there was any great commotion in the sea outside, and certainly there was no high wave or bore, or it would also have risen on the shores of the neighbouring islands. There are three entrances or straits which lead from these roads out to the open sea. Two of these are wide, and one is narrow. When the whole top of the volcano, that is Neira, Gunong Api, Lontar, and the area they enclose, was raised for a moment, the water streamed out through these straits, causing very strong currents, but as the land again instantly sank to its former level, the water poured in, and the streams of the two wider straits meeting and uniting, rolled on towards the inner end of the narrow passage. Here they all met, and piling up spread out over the adjoining low village, causing great destruction of life. At the Resident's house, a few hundred yards east of Fort Nassau, the water only rose some ten or fifteen feet above high-water level, and farther east still less. The cause assigned above, therefore, though the principal one, may not have been sufficient in itself to have made the sea rise so high over the south-western part of Neira and the opposite part of Gunong Api, and I suspect that an additional cause was that the land there sank for a moment below its proper level.

Valentyn thus describes another less destructive earthquake wave:—"In the year 1629, there was a great earthquake, and half an hour afterward a flood, which was very great, and came in calm weather. The sea between Neira and Selan (on the western end of Lontar) rose up like a high mountain, and struck on the right side of Fort Nassau, where the water rose nine feet higher than in common spring-floods. Several houses near the sea were broken into pieces and washed away, and the ship *Brill* lying near by, was whirled round three times." In this case, the facts that the water did not pour out of the roads into the sea, and that the "flood" did not come until half an hour after the shock had occurred, indicated that this wave had its origin elsewhere, and there is no need of supposing, as in the case of 1852, that any part of the group was elevated or depressed. However, all these events are but as yesterday, when we look back into the past history of this ancient volcano, for if we can judge by analogy, taking the great crater this day existing among the Zeugger Mountains as our guide, we see in our mind's eye an immense volcanic mountain before us. From its high crater, during the lapse of time, poured out successive overflows of lava, which solidified into the trachyte of Lontar. Then came a period when stones and sand were thrown up, which has not wholly ceased at the present day. During one of its mighty throes, its western half disappeared beneath the sea, if the process of subsidence had gone on so far at that time.

Slowly it sinks, until it is at least 400 feet lower than at the present time, for we found a bank of coral rock on the western end of Lontar at that height. The outer islands are now wholly submerged. This period of subsidence is then followed by one of upheaval, but not till the slow-building coral-polyps have made great reefs, which now become white chalky cliffs, and after many years attain their present elevation above the sea. A tropical vegetation meanwhile by degrees spreads downwards, closely pursuing the retreating sea, and the islands are exactly what we see them to be at the present day.

In 1846, Mr. Jukes announced, as the result of his observations in the southern part of this archipelago, that the whole line of islands eastward from the Strait of Sunda, to and including Timur, had been elevated within a recent period. On the latter island my observations, I now find, are quite identical with his. From Kolff we learn that elevated reefs are found among the islands eastward from the northern end of Timur, and here they occur again in the Bandas. Eastward of this point, and south-east from Goram, are the Matabello Islands, which, according to Mr. Wallace, are only coral reefs raised 300 or 400 feet.

North-west from the Bandas we come to Amboina. The most recent coral rock which I observed on that island was about 500 feet above the present sea-level. At that elevation many valves of the gigantic *Tridacna gigas* were found considerably decomposed, but always in pairs, as if they had once been partially surrounded with soft coral rock, which, wasting away, had allowed the valves to fall apart. Governor Arriens, who had carefully studied these recent coral reefs, gave me the important fact that he had followed them upward to a height of 800 feet, but not higher, and that at that elevation they seemed to suddenly disappear. At Wahai, on the north coast of Ceram, I found many recent corals, about 50 feet above high-water level, and also at Kayéli Bay, on the north side of Burn, at an elevation of 100 feet. The natives here assured me that the same kind of "white stone," coral rocks, was found among the hills; and I have no doubt that it will be found in the mountainous parts of all the other Moluccas, as high up as Governor Arriens has already observed it at Amboina. A member of the Commission sent by the Dutch Government to examine the coasts of New Guinea, informed me that at the back of Dorey, on the north coast, at the mouth of Geelondk Bay, there are hills of very late formations, and that he found there a recent shell at a considerable elevation, 100 or 200 feet. From this point westward, as far at least as the northern end of Celebes, all the islands are probably rising.

Thus we find over all this wide area a repetition of the subsidence followed by an upheaval already noticed on Banda. Indeed, there is every indication that all the eastern part, if not the whole, of the archipelago is now rising, and thus we have before us the grand spectacle of a great continent forming itself at the present time.

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2. *Letter to Major-General Sir Andrew Scott Waugh, on Routes between Upper Assam and Western China.* By F. A. GOODENOUGH, Esq.

(Communicated by Sir A. S. WAUGH.)

"MY DEAR SIR,

"Understanding from our mutual friend Mr. John Fergusson, of Calcutta, that you are taking an interest in the discovery of lines of communication between India and China, viâ Northern Burmah, I venture to trouble you with some little information which I have gathered during a visit to Upper Assam in 1866, and from various other sources; and I enclose a rough sketch-map,\* which will show you how short the distance is from British territory, on the one side, to the most westerly point attained from the China sea-board, viz., by Captain Blakiston, R.A., on the other.

"When in Assam I went up the Dehing River to the Terap for the purpose of visiting the coal-field there. I found that the inhabitants of a Singphoo village at the mouth of the Terap were in constant intercourse with the Hokoong valley of Upper Burmah, the locale of the amber mines and petroleum springs of that country, which they reached through passes in the Patkoi range. When there, some men from Hokoong (Beesa of the maps?) were on the spot, being about to take across some cattle.

"Inquiring about the distance, we were told that a man without a load could reach *Hokoong* in seven days, but that cattle would not complete the march under thirteen. The cattle of Assam, and especially of that part of Assam, are, from the coarseness of the herbage they feed upon, and inferiority

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\* Deposited in the Map-Room of the Society.—[Ed.]



of breed, &c., a most miserable race; and we may therefore fairly conclude that the pass or passes, across the Patkoi range are in no wise difficult. If they were so such wretched beasts as those which I saw—and the very cows about to be driven over were pointed out to me—would be incapable of undertaking the journey.

“Lower down the Dehing than the mouth of the Terap is a Fakeecal village, which I visited. The Fakeecals are Buddhists, and I found and inspected a temple there, and an establishment of Buddhist priests, who came from Burmah.

“From Hookoong (Beesa?) there are two routes by which we could proceed to China.

“*First.* In a southerly direction to Bhamo, the point of departure of the expedition under Captain Sladen.

“*Secondly.* Easterly, across the valley of the Irrawaddy, to the range of hills separating China from Burmah, through which I have always believed passes exist, and through which I have since, quite lately, heard that the Singphoos report that practicable passes *do* exist.

“It is of course unnecessary to point out that the route following the direct easterly course is much the shorter, if it really, as I must believe it does, exist. Following it, we should bring the Yang-tze-kiang within 300 miles of the Dehing; and we may venture to say that from Assam to the foot of the Chinese passes the country is practicable for a telegraph, or even for a road, whilst it also probably is so for a railway.

“The Irrawaddy, it is true, intervenes; but, as at the point where Lieutenant Wilcox early in the present century (1827) crossed it (only some 50 miles north of a direct line eastward from Beerah), it was only 80 yards wide, and fordable, it is not, probably, a very large stream where my proposed route would touch it.

“I was accompanied to the Terap in 1866 by Mr. Henry Lionel Jenkins, who has been engaged in tea-planting for the past fourteen years on the Dehing and thereabouts.

“Mr. Jenkins is a gentleman of birth and education, and he is possessed of more than ordinary intelligence and energy. He is well acquainted with the Singphoo chiefs, who are *quasi* lords of the passes over the Patkoi range, and is on friendly terms with them; and he was on one occasion invited by the head man of all to accompany him into Burmah, the *Gaum*—‘Prince’—stating that he would guarantee his safety with his head. My friend was unable at the time to avail himself of the offer, to his great regret; but he could, I doubt not, get it renewed by that Gaum’s successor at any time, if he received encouragement to make an expedition in the direction in question.

“I have now heard from Mr. Jenkins by the last mail, to the following important effect, viz.:—

“‘I have given him (Captain Macdonald, Surveyor-General of Assam) the marches from Terap to Hookoong, and from Hookoong to Bhamo; but, as there is more than one path direct east from Hookoong to Yunnan, Bhamo is entirely out of the way.

“‘Several Singphoos have told me that the Chinese do occasionally come up from Bhamo to Hookoong, but that by far the greater number come by more direct routes. Of these routes, however, I could obtain no certain information. I have got all the marches to Bhamo (twenty-two) from Terap.

“‘Hookoong to Bhamo; perfectly level road.

“‘Here is the Terap route, which is more precipitous than the Namchik route; but I have chosen the former, as it leads through large villages where supplies could be obtained. Namchik would be the route eventually for a road, but, until a road is opened, a party would travel easier by the steeper and longer, but more populous route.

“‘*1st day.* From Terap Mookh to Hoongtam Naga village; long march.



“2. To Youngbhee Naga village; over steepish hills. A long march; cross Umbang stream, about size of Terap.

“3. Cross Terap and march to Yoglee Naga village; short march.

“4. Mount and reach top of Patkoi range; long march.

“5. Descend Patkoi; steepish. Cross Namphook small stream, reach Morang Naga village.

“6. Cross Tilhee, size of Terap, reach Ishanghai village; short march.

“7. To Wadapanee; small stream, a long march to reach water.

“8. To Kaltâk village; a long march.

“9. Cross Dâgâ and camp on Desang, both large streams. No village; moderate march.

“10. To Soombogan, Singphoo village; long march.

“11. To Hookoong; short march.

“1. From Hookoong cross the Demai, larger than Dehing, and two other large streams, reach Jambo Hill; a fair march.

“2. To Leboŋ village, on the Noonkoong, larger river than Dehing, not a long march.

“3 and 4. By boat down Noonkong to Namsang Mookh.

“5. Land, and march to Santok hill; not a long march.

“6. To Nunjhan; small river.

“7. March down Nunjhan.

“8. Continue down Nunjhan to Benankhoo; Singphoo village.

“9. To Melankha village, on the Ooroop, large navigable river; short march.

“10. To small stream; long march.

“11. To Bhamoo; long march.’

“This is all that Mr. Jenkins says, but the particulars given are most valuable for the purposes of an exploring party.

“Up to this time I had always imagined that the route by Namchik, which place you will find I have marked in the map at the point where the Noa Dehing and the Booree Dehing diverge from the parent Dehing, was longer and more precipitous than that by the Terap, but, from what Mr. Jenkins says, the reverse appears to be really the case.

“Lieut. Wilcox went due east from Namchik, and got into a labyrinth of hills before he reached the Irrawaddy, encountering much difficulty in getting on, but I imagine that the route of which Mr. Jenkins speaks must go off southward, so as to evade these difficulties and get into the plain.

“I could say something more on this subject, and a good deal regarding the practicability of a railway up the Assam Valley from Rajmahal, but I fear that you would throw a more lengthy communication aside, and that the present one requires an apology on the score of its length is certain.

“F. A. GOODENOUGH.”

### 3. *Expedition of Mr. T. T. Cooper from the Yang-tze-Kiang to Thibet and India.*

THE following letter appeared in the ‘North China Daily News’ of June 15th last, from the adventurous traveller Mr. T. T. Cooper, who started from Shanghai originally with the intention of reaching Assam, over the mountain passes which traverse the high range on the western frontier of China.

He communicated his plans to the Royal Geographical Society in August, 1867, and a letter of instructions was drawn up and forwarded to him by an Expedition Committee of Council, called for the purpose in October last.

Unfortunately these instructions, and a letter from the President which accompanied them, did not reach him before starting on his journey.

“Tai-tsian-loo, Western Borders of China,  
“26th April, 1868.

“DEAR SIR,—Since writing you from the village of Hi-yan-su, a troublesome and dangerous journey of seven days brought us on the 9th instant, in company with the good Bishop of Thibet, Monsgr. Cheauvan, to this place. Our road for the first four days lay through a country similar to that about Hi-yan-su. On the morning of the 5th we arrived at Loo-din chow, a small town on the left bank of the Tai-tow-ho, a branch of the River Min at Kia-tung-foo, and navigable for small junks only 80 miles west of that place. This city is famous in China for its chain suspension-bridge, some 150 yards in span, built about 80 years ago. Crossing the river at this point we continued along its right bank, north for two days, the road winding along frightful precipices sometimes 500 feet above the river, the wall-like sides of the mountains forming gorges of terrible grandeur. At noon on our sixth day from leaving the Tai-tow-ho, we entered what is called the Tai-tsian-loo gorge or valley. This place, so I am told, is the most dangerous part of the grand route from Chen-tu to Lassa; to form an idea of it you must picture to yourself two mountains from 1000 to 1200 feet high, running parallel to each other, their sides perpendicular, and in many places overhanging the mountain torrent rushing in white anger at the base, their summits capped with snow, and a cloud of white mist throwing into this terrible gorge the gloom of twilight. The torrent (scarcely 30 yards wide), as it leaps on its headlong course to the Tai-tow-ho, washes in many places the narrow path running along its right bank with spray from numerous waterfalls; while huge boulders, forced from their resting-places high over head by the fierce hurricane which seems ever to sweep the bleak summits of these mountains, fill the gorge with the noise of a hundred thunders as they crash into the angry stream below: such is the Tai-tsian-loo gorge, at the head of which, thirty-eight miles west of the Tai-tow-ho, lies this border town of Tai-tsian-loo.

“The town Tai-tsian-loo divides the province of Sz-chuen from the Mandzu country, which extends to Kyan-kha, being so called in contradistinction to Tibet Proper, which commences only at Kyan-Kha (the tribes inhabiting this country generally speaking Tibetan, wearing the same costume, believing in the same religion, and being subject to Tibet), and is of great importance as an exchange trading mart. Thither come Shan-si merchants with tea, glass-beads, and tobacco, which they exchange with the Mandzus for hartshorn, gold, musk (from musk deer) and lynx, fox, wolf, and leopard skins, and a variety of a commoner sort, such as sheep, deer, and yak; this is the principal trade of the place. It is also of importance as a Chinese military station, containing nearly 1000 soldiers.

“As my next step onward will take me out of China into a country the trade of which can never be of great importance to my commercial friends in Shanghai, I will take leave of them with a few words relative to foreign trade with Western China. Many merchants in Shanghai told me that the exploration of the Upper Yang-tze and Western China was of no importance to their trade and sceptically asked me to prove to the contrary. I could then only point to the enormous wealth of Sz-chuen, its gigantic trade with Hankow in rhubarb, hemp, native medicines, sugar, and tobacco as exports, and cotton and piece goods as imports; all this was nothing new to them, and they looked upon my expedition as likely to result only in good pheasant or snipe shooting for myself. Even with the report of a meeting of the Royal Geographical Society extracted in your columns from ‘The Times’ of the 6th June, 1867,

before them, and reading therein the importance which Sir A. Phayre attaches to the Burma trade with Yunan, they remained unconvinced. Many, however, warmly upheld my undertaking, and to these gentlemen I address the following remarks :—

“ Chung-king, the trade gorge of four provinces, Sz-chuen, Yunan, Kwei-choo, and Chen-si, depends upon Hankow for the supply of foreign piece goods which it annually sends into these four provinces. The present junk transport on the Yang-tze between these two places, besides being extremely disastrous to trade on account of the total loss of many junks and their cargoes, is very expensive, and this, added to the Mandarins' squeezes, renders the price of foreign piece goods after leaving Chen-tu so heavy, that they are unsaleable beyond the Yang-ling range of the mountains near Chin-Chi-Chien, and this is the limit of foreign trade with Western China, numerous small rivers forming the arteries through which trade flows from Chung-king into Kwei-chow, Eastern Yunan and Southern Chen-si. The present trade between Chung-king and Yunan and Kwei-chow, is only temporary on account of the closure of the Bhamo and Tarli route and as sure as this route is opened, so sure will Burmah take to herself the trade of these two provinces and if, as is probable, British merchants establish at Ava, then a rivalry for the trade of Western Sz-chuen between China and Burma merchants seems almost certain,—the result telling probably in favour of the latter, both in export and import. Trade by this route has flourished before without European enterprise, and, as soon as it is re-opened, the trade between Hankow and Chung-king will be lessened by one-third. The Mahomedan Chief at Tarli has already established custom houses on the eastern borders of his territory, and at Hi Yan-sú I met several merchants who had come from Tarli and intended to return there to trade in spite of their having to pay Imperial and Mahomedan duty. Perhaps these facts are important for the Shanghai trade; if so, then the China merchants have but one object to gain, to attain equality with the Burma merchants by opening up the Upper Yang-tze to Chung-king. The Chinese authorities might be glad to checkmate the Mahomedan chief by this means. If the King of Burma abdicates in favour of British rule, that will place all India alongside of Western China, and no official mismanagement will cramp the energies and resources of the British merchant in Burma. For steamers properly constructed, and drawing not more than six feet of water, the navigation of the Yang-tze to Chung-king is possible. At the lowest winter level (Jan. 1868) known for some years, there were seven feet of water at the lowest rapids.

“ As to the route between Sudiya and Likiang, this in Shanghai seemed to me practically useful for the Calcutta trade with China, but I am constrained to admit now the fallacy of such a hope, and this admission is based upon the following remarks of Monsgr. Cheauvan, who resided for many years in the neighbourhood of Tarli and Likiang. He tells me, ‘Likiang is a name only, the place whereof is marked by a few small houses near the foot of the Snowy Mountains, which are impassable on account of perpetual snow and want of passes, while the Lao-tsan and Now-kiang rivers are fierce, unnavigable, and unbridged; the country through which they flow being inhabited by savage tribes constantly at war with each other, and beyond this in Bing there is another obstacle in the Pat-koi range. Admitting, for the sake of argument, that a practicable route could be found, the goods which Calcutta would send to China, Burma would send at a less cost. No! India has a brighter prospect in store for her trade with Tibet, and this must flow either through Nepaul to Lhassa or by Sudiya to Bathang; the latter route, however, having to pass the Himalayas and a dreadfully hilly country to within a short distance of Bathang. At Lhassa there are already over 3000 Nepaulese trading in European goods, while, to deal in the figurative, the rivers of Bathang run with gold.



"For the information of my sporting friends in Shanghai, I may tell them that so far my bag consists of one wild goose, shot near Hankow, my journey to this place having been through a country destitute of game.

"Up to this time I have cherished the hope of being able to reach Sudiya from Bathang, but important considerations force me to abandon the idea. Without instruments and funds I cannot and dare not penetrate the unknown country between these two places. With the help of Providence I will reach Lhasa, where, disposing of my mules and ponies, I will foot it to Khatmandoo, hoping at some future time to accompany a proper expedition through this country.

"Nothing can exceed the kindness of the Catholic missionaries in China, especially Monsgr. Desflech, bishop of Chung-king, and Monsgr. Cheauvan. To the latter I shall ever owe a deep debt of gratitude, while to the united help of the French and Italian Catholic missionaries generally I am indebted for the pleasure of being at this moment on the western borders of China.

"Personally, with the exception of a slight cold and profuse perspirations at night, I have nothing to complain of, or rather feel that it is of no use complaining; otherwise I might fill pages with grumblings at martyrdom from vermin, bad housing, the pardonable tyranny of my Chinese interpreter, and wretched food.

"For the information of future travellers, I should mention that beyond this place as far as Lhasa, money is at a great discount, two or three needles and a little thread, or a piece of red Chinese cloth, often procuring what money cannot. Rupees pass for 32 tael cents, but the Mandzu people do not particularly care for them, and sycee is used at a great loss. I have laid in a stock of needles, thread, cloth, and a kind of turquoise stone, much prized by Mandzus, and brought hither from Shansi. These stones, about the size of French beans, I purchased at 2½ taels per hundred. The idea of becoming a needle and thread hawker is novel and amusing.

"I leave this on Wednesday, the 29th inst., having been detained more than twenty days to procure mules, ponies, and an interpreter. If I am stopped at Tsamdo by the Tibetans, I shall return to this place, and make for Ava *viâ* Tarli and Bhamo, but I hope this is the last you will hear of me until I reach Nepaul.

"Trusting that this will reach you in safety,

"T. T. COOPER."

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#### 4. *Extract of a Letter from MR. W. CHANDLESS, Gold Medallist R.G.S., now exploring the Tributaries of the Amazons.*

Manáos, March 21, 1868.

My journey from England began under bad auspices, for at Southampton they discovered my photographic materials and refused to admit them on board; however, that loss was not serious. On arriving here about the end of June, I found things much changed for the worse: there were no Bolivian Indians, whose services would have enabled me to ascend the Purus; the Consul had given orders to have them laid hold of whenever they turned up here, and sent to Bolivia, on the plea that there are more than 2000 now scattered about the Amazons, and that the lack both of their labour and of their poll-tax was felt in Bolivia. The Brazilian authorities executed his orders pretty strictly; so I found I had no chance of a crew of Bolivians. In any case, however (as perhaps I said to you in England), it was too late in the year to attempt ascending

to the Beni with much hope of success, and under the circumstances impossible. Accordingly, I went by steamer up the Amazons to Tefié to try the Juruá.

I travelled about three months up the Juruá, which is about 25 days' journey beyond previous explorers *on the main river*; the distances I have not yet added up, perhaps they may come to something between 1000 and 1200 (English) miles; my farthest point was about  $7^{\circ} 12' \text{ s.}$  and  $72^{\circ} 10' \text{ w.}$  The journey was cut short by an attack of Nauas Indians, who in past times used to make forays far below, and have long been the bugbear of the upper Juruá, both to white people and Indians; they are notable for the use of large round shields of tapir-hide. We were in no danger at all in the skirmish we had with them; but my men, recollecting the recent and serious attack on the Government expedition up the River Javary, were, with but one exception, unwilling to continue up-stream, and I had no means of making them do so; already I had been forced to put all the oars at night under the awning, as twice they were thrown away in the hope of thus stopping the journey. No doubt there was a good chance of danger, as an up-stream canoe must, as you know, travel along the bank, and ambushes are easy: still we ought to have tried the thing, and I shall always look back with shame on our return. The river there was still a considerable stream, 130 to 150 yards wide, and in flood 5 or 6 fathoms deep.

The *main Juruá* does not approach the Purús, unless it be quite at the sources of both rivers: it is the Tarauacá, an affluent of the Juruá, and the only large one which rises near the Purús. João da Cunha and a good many drug-collectors have been up this river. The course of the Juruá, as might be expected, is very different from that given in maps; above lat.  $6^{\circ} 30' \text{ s.}$  its *up-stream* course is mainly west; that is, for 40 miles of southing it makes about  $3\frac{1}{2}^{\circ}$  westing. In fact, the course of all the rivers between the Madeira and Ucayali have probably this character. Captain Costa Azevedo, the Brazilian chief of the Boundary Commission with Peru, tells me that the River Javary has a similar direction. The farthest point they reached was in about  $6^{\circ} 50' \text{ s.}$ , and the river there a small stream, a mere brook, so that he doubts if it rises more than a few miles, if at all, to the south of  $7^{\circ}$ . By a treaty just concluded with Bolivia, the boundary between that country and Brazil is to run from the mouth of the River Beni to the source of the River Javary.

From Tefié I came down to this place in a canoe, and since then have made a trip to Maués,\* and up the Maués River and one of its affluents to the falls or rapids of each; this was a mere excursion, still I mapped out the river and took observations so far as weather allowed. Probably I shall remain here till the end of May; then I wish to start for the Beni—I hardly venture to say “hope,” for the difficulties of getting a crew, especially for two canoes, are very great, and with but one canoe the chance of successful exploration very small. There are two German engineers (J. and F. Keller) sent here by the Government to examine the falls, &c., of the River Madeira, and the probable expense, &c., of canalisation and making a road. They purpose starting at the end of April; but to get these men the President has been obliged to solicit the aid of the Bolivian Consul, which does not make my chance better.

W. CHANDLESS.

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\* An affluent of the right bank of the Amazons, between the Madeira and the Tapajos, and discharging itself into a large side channel of the river.—[Ed.]

5.—*Notes on the Physical Features of Belize.* By A. S. COCKBURN, ESQ.

(Communicated by the COLONIAL OFFICE.)

ON a flying visit of a few weeks along the southern coast, about a month ago, I was afforded a hasty opportunity of examining the geological formation of a portion of that part of the colony. From the short time at my disposal I could only touch at a few spots between Point Hicacos (the proposed site of the new city Austinopolis) and the Carib village of Punta Gorda, of which I now propose to give a slight sketch in continuation of my former report.\*

I found the prevailing type to be still of the tertiary period, but consisting of a system of rocks more consolidated and crystalline than those bordering the River Belize, on which I lately had the honour to report.

The whole coast from Sihun to the Sarstoon, embracing an extent of 103 miles, is intersected by no less than 23 rivers and creeks, besides several lagoons or inland lakes, which bring down a great quantity of mud and silt into the Gulf of Honduras, and more or less affect the kays and banks within the circle of that great barrier-reef which fringes the gulf, and marks the boundary of the blue waters.

The range of mountains beginning at Sihun and running nearly parallel with the coast, clothed with verdure to their summits, seem to be formed on calcareous matter, and appear no farther than two miles from the shore; but there are others, veiled in mist, rising behind higher and higher, at right angles to the coast-ridge, in amphitheatral form, whose conical shapes proclaim them to be volcanic. These give a very picturesque appearance to the landscape, and the whole was quite a treat to one long confined to the everlasting mangrove-swamps and deleterious marshes of the Belize dead-level.

On entering the splendid harbour of the "Seven Hills Estate," the seven hills conspicuous in the distance, the little kays and islets rising out of the clear water like so many emerald gems, crowned with coconut-palms bowing their plummy branches like ostrich-feathers waving in the wind, formed quite a miniature archipelago. There is excellent anchorage all along, and wells of splendent water on several of the islets; and in the basins formed by the surrounding kays and reefs the sea is as placid as an inland lake, and many little harbours of refuge are naturally created, where vessels might ride in safety, perfectly protected from the raging of the elements.

The formation is regularly stratified, and consists of a compact indurated argillaceous limestone, deposited in laminae or successive layers between their beds of very fine clay, like immense slabs of flagstone, dipping under the water at the coast, and extending several miles inland, originally horizontal, but now tilted and wavy, fractured and dislocated here and there, where the land has been uplifted into ridges and hillocks, the whole covered with a stratum of clayey loam of varying thickness, and overtopped in some places with a rich black mould arising from the decayed droppings of the primitive forest; in others superimposed by a layer of sand forming the pine and cahoon ridges.

In some places the shore is still a marshy swamp covered with mangrove-bush, tall rushes, reeds, and swamp-grass, which conceal the river-banks, and the rank vegetation extends down to the sea. In others, again, there are sandy beaches upon which the Caribs build their villages, and where the land slopes up gently inward, and the rivers run upon pebbles and clean brown sand; but the soil is comparatively sterile, as at Hicacos, where the sandy soil and broken ridges prevail up to the lagoon, some two or three miles in the interior.

At Punta Gorda the land rises abruptly in a sort of ledge five or six feet,

\* See 'Proceedings,' vol. xii. p. 72.



and the beach is strewed with a shingle consisting of large fragments of coral, flint, and feldspathic rock, mixed with a coarse gravel-like capelli,—the pieces still rough and angular, and scarcely water-worn, as if brought by the waves from no great distance; and accordingly, on further examination, I found the ledge to consist of an out-crop of conglomerates, composed of the same sort of rocks stuck in a bed of clay, like a coarse pudding-stone, but comparatively soft.

In the immediate neighbourhood there is a little stream of limpid water, called "Tom Taylor's Creek." I do not know how far inland it runs; but I am told it joins a lake about two miles in the interior. I paddled a mile up this creek to the base of the small hills in the background, where I found the stratification more fully and clearly developed.

The stream runs upon a bed of the laminated limestone, and as the ridges are approached the layers become tilted and broken, and the jagged edges of each lamina project on either side and under the stream; the intervening seams of clay being washed away, the layers come out clear and clean, showing through the transparent water the nature of the deposits. At the point I reached it was tilted at an angle of  $10^{\circ}$ , the dip being north and south, and the strike east and west, as if the strata were dislocated in the line in which the stream now runs, purposely to make an opening for it. The passage, however, is not formed by the erosion of the water, but evidently by a concussion of nature of some considerable force, which lifted the land and elevated the hills long after the limestone had been formed and consolidated under the sea.

The rock is a compact marly limestone, with a little iron oxide, in laminae of from two-tenths of an inch to two inches thick, internally traversed by veins of calcareous spar. In other places it is met with in blocks or amorphous masses with distinct crystals aggregated together in amygdaloidal nodules and permeated with the carbonized remains of decomposed seaweeds and other vegetable matter. It is of a dirty white or greyish colour when first taken up, sometimes variegated with patches of pale pink, but bleaches white on exposure to the atmosphere. Some of the slabs, almost in course of transformation into a beautiful description of marble, would make excellent paving-stones for door-steps, &c.

At Seven Hills Estate the hills, nearly equidistant from each other, range off in a somewhat irregular line, bearing south-west from the coast, and are of the usual dome-shape peculiar to the calcareous formations; they are all about the same altitude (500 to 600 feet), and the valleys between them 1000 to 1400 broad. Two of the hills are rather elongated (saddle shape), and on the ridges the slabs or layers incline at an angle of  $70^{\circ}$  on either side along the anticlinal angle, while on the apex of the domes they dip around the circumference, forming what geologists call the "*qua-qua* angles," all splintered and shattered into a thousand pieces. As partial denudation has taken place, the exposed portions have become bleached in the sun and air, and at a distance appear like fragments of broken china scattered over the surface. The valley is partially cultivated, and produces some of the most luxuriant sugar-canes I have ever seen (and I have travelled through the sugar-plantations of many of the West India Islands), some 16 feet long, by 6 and 8 inches in circumference, and in very thick stools. The soil is a thick layer of clay resting upon loam, soft and moist-cutting like cheese, and underlying a fine black mould washed down from the hills. As the washing will give a constant supply of the carbonates, the silicates, and the phosphates arising from the decomposition of the limestone, those valleys will remain always fertile, and will raton over and over again for years without becoming exhausted.

It does not appear that the laminated formation extends to the kays, for most of them near the mainland are composed of the mud, gravel, and sand brought down by the rivers, and which have become covered with the mangrove-bush and remain half submerged, as the "*bouges*" and the "*drowned kays*,"

&c.; while in others, more solid and higher out of water, these accumulations of silt and débris seem to form the foundation upon which the coral-insects have raised a superstructure. I have dug 10 feet deep on the island of Turneffe, at 200 yards from the sea, and found nothing but loose calcareous sand identical with the beach and the sea-bottom of the place; while Calabash Kay, not 500 feet distant on the east and nearer the barrier-reef, is bounded on the side next the reef by solid rocks of porite coral, meandrina, and honeycombs, &c., the channel between the two islands being deep and free of the coral-building polypifers.

Near the mainland the water is turbid, and the floor of the sea is covered with soft mud; and in some places, as at the mouth of the Manatee River, with coarse gravel and silicious sand, but more to seaward it is of white calcareous sand. At the estuary of Belize, within the bar, the dredge brings up nothing but mud mixed with ferruginous sand and dead fresh-water and marine, littoral and estuary, shells; but the farther you recede the clearer becomes the water, and the cleaner and whiter the sand, which consists generally of comminuted fragments of corals, shells, sponges, remains of crustacea, &c., in all degrees of fineness. The sand at Point Placentia, and some other places, is brown siliceous, consisting of fine particles of flint and granite, and in other places of mica, quartz, and other hypogene rocks; and the beach of several of the islets is covered with the remains of sea-eggs (sea-urchins, *echini*, and other *echinodermata*), and various species of shells of all colours, prettily mottled and variegated, some of them exceedingly minute and beautifully polished, as at Water Kay, &c. In others, again, sponges, sea-fans, pumice-stone, algæ, and other sea-weeds, are scattered about; while the conch and the star-fish, the lobster and the crab, and other *radiata*, *crustacea*, and *mollusca*, are seen through the transparent water quietly resting below, or browsing on the marine flora of the deep; and the whelk and the cockle enjoying the genial rays of the sun on the exposed rocks forming the "iron-bound coast;" immediately behind which is the deep perpendicular gulf covered over by the almost unfathomable dark-blue water of the ocean.

Some of the kays are round and oval, but the majority are more or less long and narrow, flat, and low, not unlike the "atolls" described by Darwin as appearing in the Pacific Ocean; but I am unable to state whether they are increasing or decreasing in area. Darwin says, "In those seas where circular coral-islands abound, there is a slow and continued sinking of the submarine mountains on which these masses of coral are laid, while in other areas of the South Sea where coral is found above the sea-level, and in inland situations and where there are no circular or barrier reefs, the land is on the rise." I believe these kays fluctuate in size and elevation, oscillating, alternately sinking and rising. At one time a portion is washed away by violent storms or the action of the current, and the area becomes seriously diminished; at another the tempest and the waves bring up a great quantity of sand, shells, and other débris, and the island retrieves itself, and, by the operations of the industrious untiring coral zoophytes, becomes renovated and enlarged. Though volcanoes are not far off, shocks of earthquakes are seldom felt in this alluvial bottom; but still they must have some subterranean influence, and the débris of the neighbouring volcanoes is brought down by the rivers, and pumice-stone is often seen floating about in the sea or resting on the beaches of the kays around.

St. George's Kay, about nine miles north-east from Belize, with a lagoon to leeward, and based in a crescent-shaped reef measuring 1113 yards in length by 630 in breadth, appears to have been sinking for some time. It was inundated by the hurricane of 1813, and since then it has suffered two similar catastrophes, in 1827 and 1864, and the sea on the last occasion divided it into three distinct parts. It recovered itself somewhat after the waters had sub-



sided; but still every tide cuts it very nearly across at the former divisions, and on both sides it is evidently fast washing away.

South Snake Kay, however, is an example of the gradual increase of a coral-  
island. Here the attentive observer may see clearly the palpable operations of the little tiny insects labouring hard at the construction of their stony habitations. The island is 98 miles s.s.w. of St. George's Kay, of an oval form, measuring 880 feet one way by 400 at the broadest part, and about 4 or 5 feet above the water-level, surrounded by a white, glittering, sandy beach, dry, destitute of the mangrove-swamp, and covered with vegetation and several full-grown coconut and other fruit trees, and frequented by the wild pigeons and other birds, who feed upon the fruit and nestle there in the breeding season.

At the margin of the vegetation is the stem of an old dead guana-tree, measuring 22 inches in circumference, the lower part of which is perforated with holes to about a foot upwards from the ground. If this was done by the Teredo worm, it shows that some time or other, after the tree had fully grown (how long ago it is impossible to tell), the land must have sunk that depth under the sea, and that since then the sea has receded or the land risen.

The guana lives to a great age, but this does not appear to have been very old when it was cut down; and I am not aware that it grows in the water, or affects swamps or marshy places. Be that as it may, there is the stump now, 4 feet from the edge of the water, a monument and a mark to answer the next visitor whose aspirations may lead him thither to interrogate nature in his researches after scientific truths. The first two feet from the stump towards the sea, all around the island, is covered with blocks of coral and a mass of drift-wood, with barnacles, dead sea-weeds, and other waifs and strays thrown up by the sea, and the other two feet to the water's edge is of fine white sand. The tides do not now reach this mass, and, should any storm arise, the sea would only drive the débris higher up, and cover it with sand, &c., making room for other accessions of drift. At present the 4-foot beach forms a circle round the island gently sloping towards the sea, and at about 15 to 20 feet from the shore, the minute *Lithodomi*, *Milleporæ*, *Meandrinae*, *Astreae*, and other lamelliform polypifera, are hard at work, in 2-fathom water, patiently and persistently building their mural escarpments and beautifully coloured coralline groves, which spread out into fans and ramify into trees, their varied and elegant forms mingling and blending together, and the ever tremulous water, clear as crystal, reflecting their splendid hues like so many flickering rainbows. On these structures reaching the surface, the little zoophytes leave them and descend to the bottom to secrete fresh matter, while the waves, or the current, or the tempest, will break off the fragile branches and waft them to the shore, thus continually adding to the *detritus* of the beach, and increasing the area of the island. Even now the rain, percolating through the mass, disengages carbonic acid, which, acting chemically on the lime and the silica, &c., cements the whole into a compact solid mass; and in a few years, provided no subsidence takes place in the mean time, vegetation will cover the place, and the island be permanently enlarged. This is Nature detected, as it were, in the very act of her mysterious elaborations.

Here we anchored in 4 fathoms water, at 100 yards from the shore, and the armed lead brought up fine white sand, consisting of triturated corals and shells. How long safe anchorage will continue at the same distance (the rock-forming architects always advancing seaward) future observations will show.

I cannot conclude this report without referring to an extraordinary display of the luminosity of the ocean which occurred while we were quietly anchored



in this little cove, the appearance of which was surprising and beautiful in the last degree. It was about 8 o'clock on the evening of the 21st of August, the sea was calm and smooth as a millpond, the night clear and serene, but the stars, though not dull, did not shine with any peculiar brightness. Presently, a smart breeze set in from seaward, and, being against the tide, a chopping little sea arose, and immediately our placid millpond became a fretful lake, spluttering and bubbling like a caldron of molten silver. Every ripple, every wavelet, was transformed into a flaming brush of sparkling phosphorescent light, and the spray fell on the deck and around the vessel in brilliant scintillations of liquid fire, producing a most magnificent effect! This continued for about two hours, when the scene changed. I fancy it requires a peculiar state of the atmosphere to form the display of this phenomenon, for it was not a dark night, neither was it a very clear one. The moon was absent, and in the horizon were gathering electric clouds, which gradually crept up to the meridian, slowly enveloping the heavens with a funereal pall of threatening aspect, and about 10 o'clock the whole firmament was overcast. The wind abated, the luminosity ceased, and the waters reflected only the blackness of the night in striking contrast with the former brilliancy; suddenly vivid flashes of lightning shot up to the zenith, and spread out in sheets like the aurora borealis. The peals of thunder reverberated above and below, till the vessel itself seemed to tremble on the face of the water.

This continued until midnight, when copious showers of rain succeeded, and drove me into the cabin.

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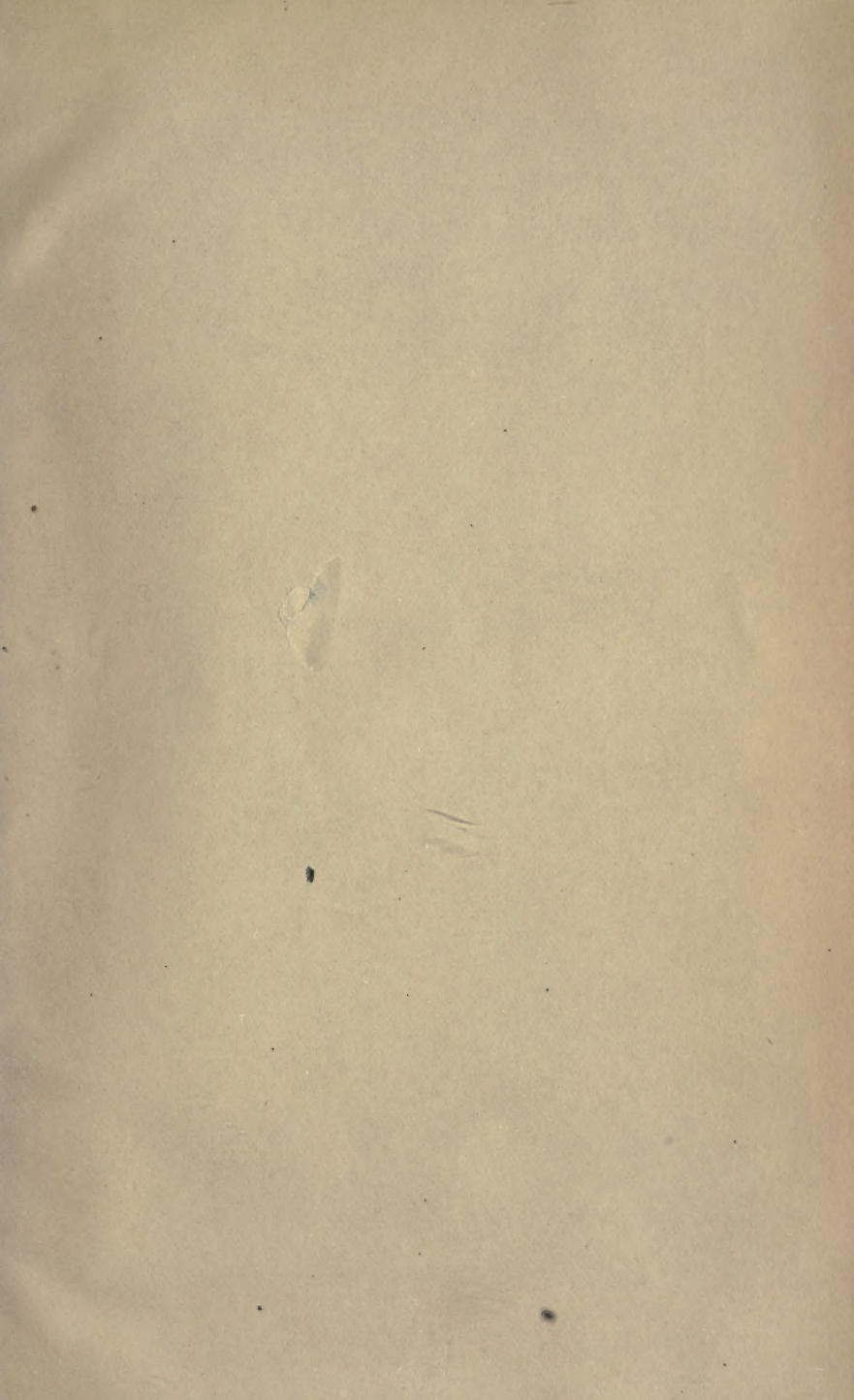
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